FLIGHT CREW CHECKLIST

F-16C/D
CCIP
AIRCRAFT

BLOCKS 40, 42, 50 AND 52

BENCHMARK SIMS - FALCON BMS

Not suited for Real Operations. Suitable only for FALCON BMS.

30 NOVEMBER 2022CHANGE 1 25 FEBRUARY 2023

INTRODUCTION

This checklist is a step-by-step guide in abbreviated form for use as a reference to ensure accomplishment of selected tasks by a predetermined sequence procedure. The intent of this checklist is to eliminate the probability of omission of a step in the accomplishment of the intended task.

The procedures contained herein are presented in the shortest practical form for use by qualified personnel and are not intended to provide full technical instructions.

This checklist does not replace the amplified version of the procedures in the Flight Manual and it is not intended as a stand-alone document. It assumes the reader already possesses a basic, working knowledge of F-16C/D aircraft. For a complete description of systems, the reader should consult the applicable documentation.

To fly the aircraft safely and efficiently, read and thoroughly understand why each step is performed and why it occurs in a certain sequence.

Changes to the checklist are made periodically to reflect functional changes to the Flight Manual, aircraft systems, procedures, or software, and are published by authorized authorities through official distribution channels.

This checklist is prepared for the software Benchmark Sims "Falcon BMS". Exact software version noted on designation section.

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SECTION N

NORMAL PROCEDURES

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COCKPIT DESIGNATION CODE

System and/or component effectivity for a particular aircraft version/cockpit and engine version is denoted by a letter code enclosed in a box located in the text or on an illustration. The symbols and designations are as follows:

AIRCRAFT, COCKPIT

No code: F-16C and F-16D aircraft

C F-16C aircraft

D F-16D aircraft

DF F-16D aircraft, forward cockpit

DR F-16D aircraft, rear cockpit

An asterisk (*) preceding steps is used to highlight procedures for **D** aircraft which apply to both **DF** Front and **DR** Rear cockpits.

ENGINE

GE 100 General Electric F110-GE-100 engine (Block 40).

PW 220 Pratt & Whitney F100-PW-220 engine (Block 42).

GE 129 General Electric F110-GE-129 engine (Block 50).

PW 229 Pratt & Whitney F100-PW-229 engine (Block 52).

SOFTWARE

FALCON BMS

WARNINGS, CAUTIONS, NOTES, COMMS

The following definitions apply to Warnings, Cautions, Notes, and Comms found throughout the manual:

WARNING Operating procedures, techniques, etc., which could result in personal injury or loss of life if not carefully followed.

CAUTION Operating procedures, techniques, etc., which could result in damage to equipment if not carefully followed.

NOTE An operating procedure, technique, etc., which is considered essential to emphasize with additional information.

EPU CHECK WARNING

Aircraft system, component, procedure, that special attention, techniques, etc., is required.

USE OF WORDS AS DESIRED AND AS REQUIRED:

As desired allows pilot preference in switch/control positioning.

As required indicates those actions which vary based on mission requirements or dedicated SOP instructions.

PREFLIGHT CHECK

EXTERIOR INSPECTION

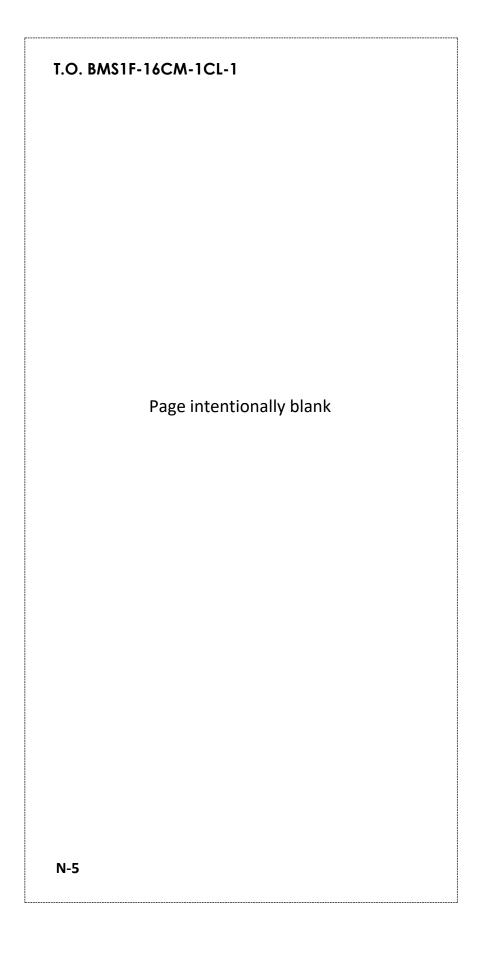
Refer to figure N-3, page N-37.

COCKPIT ACCESS

- 1. Canopy Open by positioning external canopy switch to the up position.
- 2. Ladder Position on cockpit sill.

BEFORE ENTERING COCKPIT

- 1. * Ejection seat Check.
- DR EJECTION MODE SEL handle NORM or AFT (as briefed).
- 3. MAIN PWR switch OFF.
 - **DR** For solo flight:
- 4. Loose or foreign objects Check.
- 5. Ejection seat Safe, straps secure, pins removed.
- 6. CANOPY JETTISON T-handle Secure, safety pin removed.
- 7. SPD BRK switch Center.
- 8. FUEL MASTER switch MASTER (guard down).
- 9. ENG CONT switch NORM (guard down).
- 10. Audio panels Set.
- 11. ALT GEAR handle In.
- 12. ALT FLAPS switch NORM.
- 13. GND JETT ENABLE switch OFF.
- 14. HOOK switch UP.
- 15. ARMT CONSENT switch ARMT CONSENT (guard down).
- 16. **40/42** ASHM OFF.
- 17. EJECTION MODE SEL handle SOLO
- 18. Interior LIGHTING control panel All knobs off.
- 19. OXYGEN REGULATOR OFF and 100%.
- 20. Utility light OFF and secured.



SECTION X

FAMILIARIZATION PROCEDURES

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This section is furnished for familiarization use. It will normally be inserted between BEFORE ENTERING COCKPIT and COCKPIT INTERIOR CHECK. It may also be inserted in another part of the checklist, removed, parts removed, or discarded as desired.

COCKPIT INTERIOR CHECK X-2

COCKPIT INTERIOR CHECK

- 1. * Loose or foreign objects Check.
- 2. * Harness and personal equipment Fasten.
- 3. * Rudder pedals Adjust.

Left Console

- 1. PROBE HEAT switch OFF.
- 2. **DF** STICK CONTROL switch As briefed when **DR** occupied; FWD for solo flight.
- 3. FLCS PWR TEST switch NORM.
- 4. DEFOG lever Midrange.
- 5. DIGITAL BACKUP switch OFF.
- 6. * ALT FLAPS switch NORM.
- 7. MANUAL TF FLY UP switch ENABLE.
- 8. LE FLAPS switch AUTO.
- 9. BIT switch OFF.
- 10. TRIM/AP DISC switch NORM.
- 11. ROLL, YAW, and PITCH TRIM Center.
- 12. * FUEL MASTER switch MASTER (guard down C DF and safety-wired).
- 13. TANK INERTING switch OFF.
- 14. ENG FEED knob NORM.
- 15. AIR REFUEL switch CLOSE.
- 16. IFF MASTER knob STBY.
- 17. C & I knob BACKUP.
- 18. TACAN As desired.
- 19. EXT LIGHTING control panel As required.
- 20. MASTER light switch NORM.
- 21. EPU switch NORM (guards down).
- 22. MAIN PWR switch OFF.
- 23. AVTR power switch UNTHRD.
- 24. ECM power OFF.

- 25. *COMM 1 power knob CW.
- 26. *COMM 1 mode knob SQL.
- 27. *COMM 2 power knob CW.
- 28. *COMM 2 power knob SQL.
- 29. *TACAN knob CW.
- 30. *ILS knob CW.
- 31. AB RESET switch NORM.
- 32. C DF ENG CONT switch PRI (guard down).
- 33. **DR** ENG CONT switch NORM (guard down).
- 34. JFS switch OFF.
- 35. UHF Radio knob BOTH.
- 36. Radio Frequency PRESET As briefed or SOP.
- 37. Throttle Verify freedom of motion, then OFF.
- 38. SPD BRK switch Forward.
- 39. DOG FIGHT switch Center.

Left Auxiliary Console

- 1. * ALT GEAR handle In.
- 2. CMDS switches (9) OFF.
- 3. HMCS SYMBOLOGY INT power knob OFF.
- 4. RF switch NORM.
- 5. STORES CONFIG switch As required.
- 6. LANDING TAXI LIGHTS switch OFF.
- 7. * LG handle DN and locked.
- 8. * GND JETT ENABLE switch OFF.
- 9. BRAKES channel switch CHAN 1.
- 10. ANTI-SKID switch ANTI-SKID.
- * EMER STORES JETTISON button -Cover intact.
- 12. HOOK switch UP.
- 13. * HSI CRS As desired or SOP.

Instrument Panel

- 1. ROLL switch ATT HOLD.
- 2. PITCH switch A/P OFF.
- 3. MASTER ARM switch OFF/SIM.
- 4. **DR** ARMT CONSENT switch ARMT CONSENT (guard down).
- 5. LASER ARM switch OFF.
- *6. HUD/ASHM Set.
- *7. Altimeter Set.
- 8. FUEL QTY SEL knob NORM.
- 9. EXT FUEL TRANS switch NORM.

Right Auxiliary Console

1. * Clock - Set.

Right Console

- 1. SNSR PWR switches (4) OFF.
- 2. HUD control panel Set.
- 3. NUCLEAR CONSENT switch OFF (guard down).
- 4. ZEROIZE switch OFF.
- 5. **C DF** VOICE MESSAGE switch VOICE MESSAGE.
- 6. * Wristrest and armrest As desired.
- 7. * Interior LIGHTING control panel As desired.
- 8. TEMP knob AUTO.
- 9. AIR SOURCE knob NORM.
- 10. Secure voice POWER switch (if installed) OFF.
- 11. AVIONICS POWER switches OFF.
- 12. ANTI ICE switch AUTO/ON.
- 13. IFF ANT SEL switch NORM.
- 14. UHF ANT SEL switch NORM.
- 15. * OXYGEN System Check.

COCKPIT INTERIOR CHECK

1. Interior check – Complete.

AFTER COCKPIT CHECK IS COMPLETE - VERIFY

- * FUEL MASTER switch MASTER (guard down C DF and safety-wired).
- 2. ENG FEED knob NORM.
- 3. EPU switch NORM (guards down).
- 4. C DF ENG CONT switch PRI (guard down).
- 5. **DR** ENG CONT switch NORM (guard down).
- 6. * Throttle OFF.
- 7. * LG handle DN and locked.
- 8. * HOOK switch UP.
- 9. MASTER ARM switch OFF.
- 10. AIR SOURCE knob NORM.
- 11. Loose or foreign objects Check.

BEFORE STARTING ENGINE

- Canopy * ARMS IN, CLOSE and SPIDER LOCK.
- 2. MAIN PWR switch BATT. Check:
 - a. MAIN, STBY, FLCS RLY lights ON.
- 3. FLCS PWR TEST switch TEST and hold. Check:
 - a. FLCS PWR lights (4) ON.
 - b. ACFT BATT TO FLCS light ON.
 - c. FLCS RLY light OFF.
 - d. FLCS PMG light ON.
- 4. FLCS PWR TEST switch Release.
- 5. JFS RUN light Check OFF.
- 6. MAIN PWR switch MAIN PWR. Check:
 - a. FLCS RLY light ON.
 - b. ELEC SYS light ON.
 - c. SEC light ON.
 - d. ENGINE light ON.
 - e. HYD/OIL PRESS light ON.
- 7. EPU GEN and EPU PMG lights Confirm OFF.
- 8. Communications **DF DR** cockpits established. (Not implemented in BMS yet)
- 9. Communications established with Crew Chief. (Not implemented in BMS yet)

STARTING ENGINE PW 229

NOTE To prevent possible depletion of battery power, do not allow MAIN PWR switch to remain in BATT or MAIN PWR for more than 5 minutes without engine running.

- 1. JFS switch START 2. Check:
 - a. JFS RUN light ON within 30 sec.
 - b. ACFT BATT TO FLCS light.
 - c. FLCS RLY light OFF.
 - d. FLCS PMG light ON.
- 2. SEC caution light Check off.

After one minute since illumination of JFS RUN light:

- 3. Throttle Advance to IDLE at 20% RPM minimum. Check:
 - a. 25% RPM HYD/OIL light ON.
 - Not less than 30 sec MAIN PWR out of OFF.
 - c. HYD A & B Above 1000 psi.
 - d. JFS Auto shutdown at 50% RPM.
- 4. ENGINE warning light OFF at ~55% RPM.

NOTE Engine light-off occurs within 10 seconds after throttle advance and is indicated by an airframe vibration and an increase in RPM followed by an increase of FTIT.

NOTE To ensure the emergency buses are being powered by the STBY GEN, prior to the MAIN GEN coming on line, check:

- SEAT NOT ARMED caution light ON.
- 3 GREEN WHEELS DOWN lights ON. 5-10 sec after the STBY GEN comes online, the MAIN GEN comes online and the STBY GEN goes offline.

(Cont)

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- * Engine at idle and check:
- 5. JFS switch Confirm OFF.
- 6. HYD/OIL PRESS warning light OFF.

NOTE Light may not go OFF until RPM is increased 2-3% above IDLE. If it comes ON again at IDLE, notify maintenance.

- 7. FUEL FLOW 500-2000 pph.
- 8. OIL pressure 15 psi (minimum).
- 9. NOZ POS Greater than 80%.
- 10. RPM 65-77%.
- 11. FTIT 625°C or less.
- 12. HYD PRESS A & B 2850-3250 psi.
- 13. Six fuel pump lights (ground crew) ON. (Not implemented in BMS yet)
- 14. Main fuel shutoff valve Check.
- 15. JFS doors Verify closed.
- 16. Throttle cutoff release Check.

 Without actuating cutoff release handle, lift and rotate throttle grip outboards and try to retard to OFF.

CAUTION In case of Crew Chief response for any engine warning lights, EMS FAULT or ENG NOGO, abort aircraft and notify maintenance.

WARNING Do not make stick inputs while ground crew is in proximity of control surfaces.

STARTING ENGINE GE 129

NOTE To prevent possible depletion of battery power, do not allow MAIN PWR switch to remain in BATT or MAIN PWR for more than 5 minutes without engine running.

- 1. JFS switch START 2. Check:
 - a. JFS RUN light ON within 30 sec.
 - b. ACFT BATT TO FLCS light.
 - c. FLCS RLY light OFF.
 - d. FLCS PMG light ON.
- 2. SEC caution light check OFF.

After one minute since illumination of JFS RUN light:

- Throttle Advance to IDLE at 20% RPM minimum. Check:
 - a. 25% RPM HYD/OIL light ON.
 - Not less than 30 sec MAIN PWR out of OFF.
 - c. HYD A & B Above 1000 psi.
 - d. JFS Auto shutdown at 50% RPM.
- 4. ENGINE warning light OFF at ~60% RPM.

NOTE Engine light-off occurs within 10 seconds after throttle advance and is indicated by an airframe vibration and an increase in RPM followed by an increase of FTIT.

NOTE To ensure the emergency buses are being powered by the STBY GEN, prior to the MAIN GEN coming on line, check:

- SEAT NOT ARMED caution light ON.
- 3 GREEN WHEELS DOWN lights ON. 5-10 sec after the STBY GEN comes online, the MAIN GEN comes online and the STBY GEN goes offline.

(Cont)

N-10

- * Engine at idle and check:
- 5. JFS switch Confirm OFF.
- 6. HYD/OIL PRESS warning light OFF.

NOTE Light may not go OFF until RPM is increased 2-3% above IDLE. If it comes ON again at IDLE, notify maintenance.

- 7. FUEL FLOW 700-1700 pph.
- 8. OIL pressure 15 psi (minimum).
- 9. NOZ POS Greater than 94%.
- 10. RPM 62-80%.
- 11. FTIT 650°C or less.
- 12. HYD PRESS A & B 2850-3250 psi.
- 13. Six fuel pump lights (ground crew) ON. (Not implemented in BMS yet)
- 14. Main fuel shutoff valve Check.
- 15. JFS doors Verify closed.
- 16. Throttle cutoff release Check.

 Without actuating cutoff release handle, lift and rotate throttle grip outboards and try to retard to OFF.

CAUTION In case of Crew Chief response for any engine warning lights, EMS FAULT or ENG NOGO, abort aircraft and notify maintenance.

WARNING Do not make stick inputs while ground crew is in proximity of control surfaces.

STARTING ENGINE PW 220

NOTE To prevent possible depletion of battery power, do not allow MAIN PWR switch to remain in BATT or MAIN PWR for more than 5 minutes without engine running.

- 1. JFS switch START 2. Check:
 - a. JFS RUN light ON within 30 sec.
 - b. ACFT BATT TO FLCS light.
 - c. FLCS RLY light OFF.
 - d. FLCS PMG light ON.
- 2. SEC caution light check OFF.

After one minute since illumination of JFS RUN light:

- 3. Throttle Advance to IDLE at 20% RPM minimum. Check:
 - a. 25% RPM HYD/OIL light ON.
 - Not less than 30 sec MAIN PWR out of OFF.
 - c. HYD A & B Above 1000 psi.
 - d. JFS Auto shutdown at 50% RPM.
- 4. ENGINE warning light OFF at ~55% RPM.

NOTE Engine light-off occurs within 10 seconds after throttle advance and is indicated by an airframe vibration and an increase in RPM followed by an increase of FTIT.

NOTE To ensure the emergency buses are being powered by the STBY GEN, prior to the MAIN GEN coming on line, check:

- SEAT NOT ARMED caution light ON.
- 3 GREEN WHEELS DOWN lights ON. 5-10 sec after the STBY GEN comes online, the MAIN GEN comes online and the STBY GEN goes offline.

- * Engine at idle and check:
- 5. JFS switch Confirm OFF.
- 6. HYD/OIL PRESS warning light OFF.

NOTE Light may not go OFF until RPM is increased 2-3% above IDLE. If it comes ON again at IDLE, notify maintenance.

- 7. FUEL FLOW 500-1500 pph.
- 8. OIL pressure 15 psi (minimum).
- 9. NOZ POS 70-95%.
- 10. RPM 60-76%.
- 11. FTIT 575°C or less.
- 12. HYD PRESS A & B 2850-3250 psi.
- 13. Six fuel pump lights (ground crew) ON. (Not implemented in BMS yet)
- 14. Main fuel shutoff valve Check.
- 15. JFS doors Verify closed.
- 16. Throttle cutoff release Check.

 Without actuating cutoff release handle, lift and rotate throttle grip outboards and try to retard to OFF.

CAUTION In case of Crew Chief response for any engine warning lights, EMS FAULT or ENG NOGO, abort aircraft and notify maintenance.

WARNING Do not make stick inputs while ground crew is in proximity of control surfaces.

STARTING ENGINE GE 100

NOTE To prevent possible depletion of battery power, do not allow MAIN PWR switch to remain in BATT or MAIN PWR for more than 5 minutes without engine running.

- 1. JFS switch START 2. Check:
 - a. JFS RUN light ON within 30 sec.
 - b. ACFT BATT TO FLCS light.
 - c. FLCS RLY light OFF.
 - d. FLCS PMG light ON.
- 2. SEC caution light check OFF.

After one minute since illumination of JFS RUN light:

- 3. Throttle Advance to IDLE at 20% RPM minimum. Check:
 - a. 25% RPM HYD/OIL light ON.
 - Not less than 30 sec MAIN PWR out of OFF.
 - c. HYD A & B Above 1000 psi.
 - d. JFS Auto shutdown at 50% RPM.
- 4. ENGINE warning light OFF at ~60% RPM.

NOTE Engine light-off occurs within 10 seconds after throttle advance and is indicated by an airframe vibration and an increase in RPM followed by an increase of FTIT.

NOTE To ensure the emergency buses are being powered by the STBY GEN, prior to the MAIN GEN coming on line, check:

- SEAT NOT ARMED caution light ON.
- 3 GREEN WHEELS DOWN lights ON. 5-10 sec after the STBY GEN comes online, the MAIN GEN comes online and the STBY GEN goes offline.

(Cont)

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- * Engine at idle and check:
- 5. JFS switch Confirm OFF.
- 6. HYD/OIL PRESS warning light OFF.

NOTE Light may not go OFF until RPM is increased 2-3% above IDLE. If it comes ON again at IDLE, notify maintenance.

- 7. FUEL FLOW 700-1700 pph.
- 8. OIL pressure 15 psi (minimum).
- 9. NOZ POS Greater than 94%.
- 10. RPM 62-80%.
- 11. FTIT 650°C or less.
- 12. HYD PRESS A & B 2850-3250 psi.
- 13. Six fuel pump lights (ground crew) ON. (Not implemented in BMS yet)
- 14. Main fuel shutoff valve Check.
- 15. JFS doors Verify closed.
- 16. Throttle cutoff release Check.

 Without actuating cutoff release handle, lift and rotate throttle grip outboards and try to retard to OFF.

CAUTION In case of Crew Chief response for any engine warning lights, EMS FAULT or ENG NOGO, abort aircraft and notify maintenance.

WARNING Do not make stick inputs while ground crew is in proximity of control surfaces.

AFTER ENGINE START

NOTE Priority is to perform functionality checks on specific systems essential for flight safety, in certain order. If any test is continuously failing, abort aircraft and notify maintenance.

- 1. TEST switch panel Check:
 - a. PROBE HEAT switch PROBE HEAT (caution light OFF).
 - PROBE HEAT switch TEST (verify caution light, flashing 3-5 times per sec).
 - c. PROBE HEAT switch OFF.
 - d. FIRE & OHEAT DETECT button Test (press and hold, verify OVERHEAT caution and ENG FIRE warn lights).
 - e. MAL & IND LTS button Test (press and hold, verify VMS audio messages and ALL light indicators ON).

SEC CHECK

NOTE PW 220 / PW 229 SEC - Check after the engine has run at idle for at least 30 seconds. May be delayed until the BEFORE TAKEOFF check. GE 100 / GE 129 SEC - Check. May be delayed until the BEFORE TAKEOFF check.

- 2. SEC CHECK. Must be completed within 30 seconds after selecting SEC.
 - a. Throttle IDLE for at least 30 sec.
 - b. Brakes Apply.
 - c. **C DF** ENG CONT switch Raise guard, then SEC.
 - d. Verify NOZZLE closing gently to less than 5%.
 - e. SEC caution light ON.
 - f. Throttle Advance to 73% minimum, verify engine response to throttle movement.
 - g. Throttle IDLE, verify NOZZLE remains closed.
 - h. **C DF** ENG CONT switch PRI (guard down).
 - i. **DR** ENG CONT switch NORM (guard down).
 - Verify NOZZLE opening gently to greater than 80%, with characteristic loud whistle sound from the Convergent Exhaust Nozzle Control (CENC).
 - k. SEC caution light OFF.
 - I. Brakes Release.

PRE EPU CHECK

- 3. EPU GEN and EPU PMG lights Confirm off.
- 4. EPU switch OFF.
- 5. Ground safety pins (ground crew) Remove.
- 6. EPU switch NORM.

(Cont)

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EPU CHECK WARNING

NOTE Flight test experience has shown that power spikes occurring during Emergency Power Unit (EPU) checks have resulted in subsystem failures, loss of DTC-loaded data, and loss of selected system settings.

CAUTION Performing EPU checks after avionics power is turned on may result in subsystem failures, loss of DTC-loaded data, and loss of selected system settings. EPU check must be performed at this step prior to turning on avionic systems.

- 7. EPU CHECK.
 - a. * OXYGEN 100%.
 - EPU GEN and EPU PMG lights Confirm OFF.
 - c. EPU switch Raise rear guard, then OFF.
 - d. EPU switch NORM, rear guard down.
 - e. Brakes Apply.
 - f. Throttle increase RPM 5% above normal idle and up to 85% RPM.
 - g. EPU/GEN TEST switch EPU/GEN and HOLD.
 - h. EPU AIR light ON.
 - EPU GEN and EPU PMG lights OFF (may come ON momentarily at start of test).
 - j. FLCS PWR lights ON.
 - k. EPU RUN light ON 5 sec minimum (within 10 sec).
 - I. EPU/GEN TEST switch OFF.
 - m. Throttle IDLE.

- n. Brakes Release.
- EXT LIGHTING POSITION -STEADY.
- p. * OXYGEN As desired.

HYDRAZINE WARNING

COCKPIT CREW: In case of EPU Check fail, or Hydrazine activation, depletion, or suspected leak during the test, Pilot:

- Retain EXT LIGHTING FLASH.
- Activate LANDING LIGHT ON.
- Hand-signals to alert Crew Chief stay away.
- Follow emergency procedures for ground activated EPU.

HYDRAZINE WARNING

GROUND CREW: In case of Hydrazine activation, depletion, or suspected leak during the test, Crew Chief:

- Quickly move away opposite of wind direction.
- Notify Pilot by hand-signals.
- Follow emergency procedures for ground activated EPU.

- 8. AVIONICS POWER panel Set.
 - a. MMC switch MMC.
 - b. ST STA switch ST STA.
 - c. MFD switch MFD (24 sec for warmup).
 - d. UFC switch UFC.
 - e. GPS TRK switch GPS TRK (if aircraft is parked within a shelter, enable GPS TRK after taxi out of shelter).
 - f. DL switch DL.
 - g. MIDS LVT knob ON (wait at least 10 seconds after powering MMC).

(Not implemented in BMS yet)

NOTE It is important for the pilot to set a current altimeter setting before turning the EGI ON in order to ensure that the free inertial (INS-only) altitude loop is properly and accurately initialized to the parking spot MSL or field elevation.

- h. Set altimeter QNH to match airfield or parking spot MSL known altitude.
- i. EGI ALIGN NORM (after DED display visible).

NOTE If coordinates have not appeared yet on DED and attempt to enter manually, EGI goes to AUTO IFA with no alignment.

- 9. INS-Align.
- 10. SNSR PWR panel:
 - a. LEFT HDPT switch As required (ON if HDPT 5L / NVP loaded).
 - b. RIGHT HDPT switch As required (ON if HDPT 5R / TGP loaded).

- c. FCR switch FCR.
- d. RDR ALT switch RDR ALT (STBY if ground crew need to perform tasks beneath the front airframe section).
- 11. * HUD / ASHM As desired.
- 12. HMCS SYMBOLOGY INT knob ON (WARM UP) (if applicable).
- 13. * Ejection seat Adjust position height.
- 14. IFF MASTER knob STBY.
- 15. C & I knob UFC.
- 16. MFD MFL Clear.
- 17. MFD DTC Load.

FLCS BIT CHECK

- 18. LMFD FLCS.
- 19. TRIM Check NEUTRAL-NORM.
- 20. FLT CONTROL Panel: Check all switches positions looking inward.
- 21. Flight controls Cycle (Stick and Rudder) for 20 sec min.
- 22. FLCS BIT Initiate and monitor. (Switch magnetically stays to BIT position as long as BIT check runs, approx. 45 sec).
- 23. LMFD FLCS BIT PASS message. (Switch drops to OFF).

NOTE If BIT FAIL, FLCS RESET, cycle again flight controls and initiate again BIT. If multiple BIT FAIL, abort aircraft and notify maintenance.

In parallel with FLCS BIT Check run:

- 24. WHEELS down lights Check three green.
- 25. SAI Set. (Not implemented in BMS yet)
- 26. EPU FUEL QUANTITY: 95 102%

- 27. MFDs As desired.
- 28. UHF / VHF Radios As desired.
- 29. Avionics Program as required and verify (manual or data transfer cartridge).

SPEED BRAKES CHECK

30. Speed Brakes switch - Cycle (Hold switch aft for 60° fully open with WoW).

NOTE It takes ~2 sec for Speed Brakes to fully open to 60° and ~6 seconds to fully close.

After FLCS BIT completed:

DBU CHECK

- 31. *DBU CHECK
 - a. DIGITAL BACKUP switch BACKUP.
 - b. Operate controls All surfaces respond normally.
 - c. DIGITAL BACKUP switch OFF.

TRIM CHECK

- 32. TRIM CHECK
- 33. TRIM/AP switch DISC
- 34. TRIM/AP switch NORM

MPO CHECK

- 35. *MPO CHECK
- 36. * **D** FLCS override Check.
- 37. * D Stick Control Check.
- 38. Operate controls. All surfaces respond normally; no FLCS lights on.
- 39. STICK CONTROL switch As briefed.
- 40. DR ASIU panel As desired.

AR CHECK

41. *AR system (if required) - Check. (Cont)

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BRAKES CHECK

42. Brakes - Check both channels; then return to CHAN 1.

ANTI-ICE CHECK

- 43. Anti-ice Check
 - a. ENGINE OFF
 - b. Verify: FTIT decr. >= 10deg
 - c. ENGINE AUTO

NOTE If there is visible moisture and ambient temperature is 45°F (7°C) or less, place the ANTI ICE switch to ON.

- 44. Intercom (ground crew) Disconnect.
- 45. Avionic BIT's As desired.
- 46. **C DF** Seat Adjust as desired.

OBOGS CHECK

47. Oxygen system – Check (at least 2 minutes after engine start)

Perform the following:

- 48. Pressure Check 50-120 psi.
- 49. Mode lever PBG/ON (as required).
- 50. Diluter lever NORM.

 (Not implemented in BMS yet).
- 51. EMER lever NORM.

 (Not implemented in BMS yet).
- 52. FLOW indicator Check.
- 53. EMER lever EMER. / Check for positive oxygen pressure and mask and hose/connector leakage.
- 54. EMER lever NORM.

END

BEFORE TAXI

- 1. Canopy Close and lock.
- 2. HAVE QUICK radio Set and check (if required).
- 3. *Altimeter and altitude indications Set and check.
- 4. Exterior lights As required.
- 5. INS knob NAV
- 6. Chocks (ground crew) Remove.

CAUTION Pods (TGP) should be stowed for Taxi.

TAXI

- 1. *Brakes and NWS Check.
- 2. *Heading Check.
- 3. *Flight instruments Check for proper operation.

BEFORE TAKEOFF

- 1. *ALT FLAPS switch NORM.
- 2. Trim Check pitch and yaw trim centered and roll trim as required.
- 3. C DF ENG CONT switch PRI (guard down).
- 4. **DR** ENG CONT switch NORM (guard down).
- 5. Speedbrakes Closed.
- 6. Canopy Close, lock, light off.
- 7. IFF Set and check.
- 8. External tanks (if installed) Verify feeding.
- 9. FUEL QTY SEL knob NORM.
- 10. STORES CONFIG switch As required.
- 11. *GND JETT ENABLE switch As required.
- 12. *Harness, leads, and anti-g system Check.
- 13. FLIR As required.
- 14. TFR As required.
- 15. PROBE HEAT switch PROBE HEAT.
- 16. *Ejection safety lever Arm (down).
- 17. *Flight controls Cycle.
- 18. *OIL pressure Check psi.
- 19. *HYD pressures Check psi.
- 20. *ALOW MSL FLOOR Data Check.
- 21. *All warning and caution lights Check.
- 22. Adjustable sliding holder (when utility light is not in use C DF Full forward, rotated cw, and secured.
- 23. *TGP Stow.
- 24. ECM panel As required.

Takeoff Roll Trim with Asymmetric Stores

DATA BASIS FLIGHT TEST

CONFIGURATION:

- LEF'S SCHEDULED DEGREES
- TEF'S AT 20 DEGRESS

NOTES:

- INCREASE TAKEOFF SPEED 2 KTS FOR EACH DOT OF ROLL TRIM APPLIED TO COMPENSATE FOR REDUCED LIFT. TAKEOFF DISTANCE INCREASES PROPORTIONATELY TO THE SPEED INCREASE.
- IT IS POSSIBLE TO EXCEED THE LATERAL TRIM AUTHORITY OF THE AIRCRAFT FOR ONSPEED TAKEOFF WITH A NET ASYMMETRIC (ROLLING) MOMENT LESS THAN AIRCRAFT TAKEOFF LIMITS.

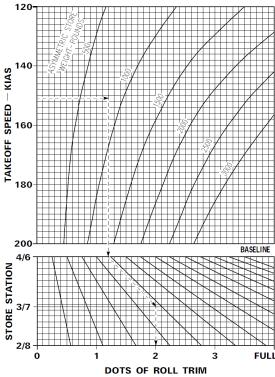


Figure N-1. Takeoff Roll trim with Asymmetric Stores

TAKEOFF AND LANDING CROSSWIND LIMITS

NOTES:

- CROSSWIND LIMITS FOR RCR VALUES 4-23 MAY BE OBTAINED BY INTERPOLATING BETWEEN THE LIMITS SHOWN.
- ENTER CHART WITH STEADY WIND TO DETERMINE HEADWIND COMPONENT AND MAXIMUM GUST VELOCITY TO DETERMINE CROSSWIND COMPONENT.

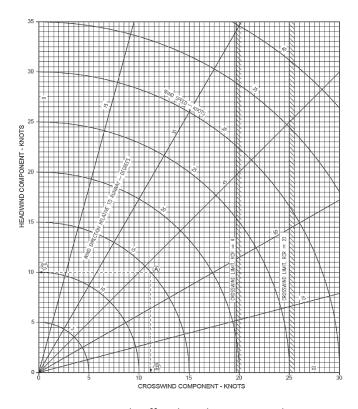


Figure N-2. Takeoff and Landing Crosswind Limits

CLIMB/IN-FLIGHT/OPERATIONAL CHECKS

- 1. Fuel Check quantity/transfer/balance.
- 2. FUEL QTY SEL knob NORM.
- 3. Oxygen system Check.
- 4. Cockpit pressurization Check.
- 5. Engine instruments Check.
- 6. HYD PRESS A & B Check.

DESCENT/BEFORE LANDING

- 1. Fuel Check quantity/transfer/balance.
- 2. Final approach airspeed Compute.
- 3. DEFOG lever/cockpit heat As required.
- 4. Landing light On.
- *Altimeter and altitude indications -Check altimeter setting, ELECT versus PNEU mode altimeter readings, and ELECT mode altitude versus altitude displayed in HUD.
- *Attitude references Check ADI/HUD/SAI.
- 7. ANTI ICE switch As required.
- 8. TGP Stow.

AFTER LANDING

- 1. PROBE HEAT switch OFF.
- 2. ECM power Off.
- 3. Speedbrakes Close.
- 4. *Ejection safety lever Safe (up).
- 5. IFF MASTER knob STBY.
- 6. IFF M-4 CODE switch HOLD.

(Cont)

N-28

- 7. LANDING TAXI lights As required.
- 8. ZEROIZE switch As required.
- 9. Armament switches Off, safe, or normal.

PRIOR TO ENGINE SHUTDOWN

- 1. Canopy handle Up.
- 2. EPU safety pin (ground crew) In.
- 3. EGI Check.
- 4. MFL Record (as required).
- 5. AVTR power switch UNTHRD.
- 6. C & I knob BACKUP.
- 7. EGI knob OFF.
- 8. Avionics OFF.

ENGINE SHUTDOWN

PW 220 When ready to shut down the engine, oil scavenge should be performed, conditions permitting.

- 1. **PW 220** Throttle Advance to 75-78 percent rpm (stabilize for 5-10 seconds).
- 2. **PW 220** Throttle Retard to IDLE for 1-2 seconds.
- Throttle OFF.
- 4. JFS RUN light Check.

After main generator drops offline:

- 5. EPU GEN and EPU PMG lights Confirm off.
- 6. MAIN PWR switch OFF.
- *Oxygen hose, survival kit straps, lapbelt, g-suit hose, and vest hose - Disconnect, stow.
- 8. *OXYGEN regulator OFF and 100%.
- 9. **40/42** HUD glareshield Stow vertically.
- 10. Canopy Open.

SCRAMBLE

Perform the following preflight inspections prior to placing the aircraft on quick response status:

- 1. EXTERIOR INSPECTION.
- 2. BEFORE ENTERING COCKPIT.
- 3. COCKPIT INTERIOR CHECK.
- 4. BEFORE STARTING ENGINE.
- 5. STARTING ENGINE.
- AFTER ENGINE START (include EPU check if EPU safety pin was installed since last EPU check, but do not remove MLG ground safety pins).
- 7. Aircraft cocked for scramble Per local policies and directives.

AIRCRAFT ON QUICK RESPONSE STATUS

If the above actions were not completed prior to scramble, normal preflight procedures should be used.

- 1. FLCS power Check.
- 2. MAIN PWR switch MAIN PWR.
- 3. Engine Start.
- 4. Canopy Close and lock.
- 5. Instruments Check.
- OXYGEN system Don oxygen mask and set OXYGEN diluter lever to 100% for approximately 15 minutes.
- 7. EPU GEN and EPU PMG lights Confirm off.
- 8. EPU Check (if EPU safety pin was installed since last EPU check).
- 9. SNSR PWR switches As required.
- 10. AVIONICS POWER switches

As required.

11. EGI knob - STOR HDG.

(Cont)

- 12. FLCS BIT Accomplish.
- 13. MFD's As desired.
- 14. SMS As desired.
- 15. *HUD/ASHM As required.
- 16. EGI knob NORM or NAV as required.
- 17. Chocks and safety pins (ground crew) Remove.
- 18. *Brakes and NWS Check.
- 19. *Ejection safety lever Armed (down).
- 20. * Flight control surfaces Cycle.
- 21. IFF As required.

HOT REFUELING

PRIOR TO HOT PIT ENTRY

- 1. AFTER LANDING checks Complete.
- 2. AIR REFUEL switch OPEN; RDY light on.
- 3. RF switch SILENT.
- 4. *GND JETT ENABLE switch OFF.

PRIOR TO HOT PIT ENTRY

Perform the following actions prior to refueling:

- 1. EPU safety pin (ground crew) Installed.
- 2. *Personal equipment leads (except oxygen and communication) As desired.
- 3. Canopy As desired.
- Brake and tire inspection (ground crew) -Complete.
- Intercom with refueling supervisor -Established.

DURING HOT REFUELING

- 1. *Be alert for visual or voice signals from refueling supervisor.
- 2. *Terminate refueling if intercom contact is lost Visual signal.
- *Ground control radio frequency -Monitor.
- 4. *Ensure hands are visible to ground crew.

HOT REFUELING COMPLETE

- 1. AIR REFUEL switch CLOSE.
- EPU GEN and EPU PMG lights Confirm off
- 3. EPU switch OFF.
- 4. EPU safety pin (ground crew) Removed.
- 5. EPU switch NORM.
- EPU check Required if flight is planned after hot pit refueling and may be delayed until BEFORE TAKEOFF check with avionics and SNSR PWR off.
 - EGI may remain on.
- 7. Intercom (refueling supervisor) Disconnect.
- 8. Taxi clear of refueling area and configure aircraft as required.
- 9. RF switch As required.
- 10. AFTER ENGINE START, TAXI and BEFORE TAKEOFF checks Perform as required.

QUICK TURNAROUND

PRIOR TO ENGINE SHUTDOWN

- 1. AFTER LANDING checks Complete.
- PRIOR TO ENGINE SHUTDOWN checks -Complete.
- 3. Communication with ground crew Establish (if required).
- 4. ENGINE SHUTDOWN checks Complete.
- 5. Aircraft setup IAW local procedures.

SUPPLEMENTAL PROCEDURES

NORMAL GYROCOMPASS ALIGNMENT

- 1. EGI knob NORM.
- 2. ICP/DED Enter correct data (LAT, LNG, and SALT).
- 3. Alignment status Check.
 - a. ADI OFF and AUX flags retracted.
 - b. HSI Check magnetic heading, DME, bearing pointer, and CDI deflections.
 - c. HUD Check display of pitch, roll, and digital data.
 - d. DED/HUD Check alignment status. Verify that the steady RDY/ALIGN display changes to a flashing display and alignment status is 0.8.
- Alignment incomplete Auto-Nav entered by Taxiing any time after steady RDY/ALIGN display appears (EGI knob still in NORM).
- 5. Alignment complete NAV after flashing RDY/ALIGN appears (if desired).
- 6. Before takeoff EGI knob to NAV.

INTERRUPTED ALIGNMENT (IA)

- 1. EGI knob NAV after steady RDY/ALIGN is displayed in HUD/DED.
- 2. Aircraft Taxi.
- 3. NORM When aircraft is stopped.
- 4. Prior to takeoff NAV.

STORED HEADING ALIGNMENT

- 1. EGI knob STOR HDG.
- 2. DED Verify correct data (LAT, LNG, and THDG).
- 3. ICP/DED Verify/enter correct system altitude.
- 4. DED INS page/HUD Verify flashing RDY/ALIGN.
- 5. EGI knob NAV (prior to takeoff).

ILS PROCEDURES

- 1. DED Verify CNI display.
- 2. T-ILS button Depress and release.
- 3. ILS frequency Key in and ENTR.
- 4. DCS Position asterisks about selectable items.
- 5. HSI Set inbound localizer course.
- 6. INSTR MODE knob ILS/TCN or ILS/NAV.
- 7. HSI M button PLS/TACAN or PLS/NAV.

JHMCS ALIGNMENT

- 1. LIST button Depress and release.
- 2. 0 button Depress and release.
- 3. RCL Depress and release.
- 4. SEQ Depress and release.
- 5. 0 Align Cursor enable until "ok"
- 6. 0 Align (AZ/EL)
- 7. 0 Align (ROLL)
- 8. RTN Depress and release.

TGP HARDPOINT POWER CYCLING

WARNING The laser mode must be confirmed after cycling hardpoint power. If inadvertently fired in COMBAT mode, anyone illuminated by the laser within 12 miles of the aircraft is in danger of eye damage.

- 1. LASER ARM switch OFF.
- 2. TMS Down to break track.
- 3. TGP MFD Select STBY mode.
- 4. RIGHT HDPT switch OFF.
- 5. RIGHT HDPT switch (after 1 minute) RIGHT HDPT.

EXTERIOR INSPECTION

Refer to figure N-3, page N-37.

AIRCRAFT SERVICING

Refer to figure N-4, page N-42.

TAKEOFF AND LANDING DATA CARD

Refer to figure N-5, page N-43.

ENGINE LIMITATIONS

PW 229 Refer to page N-44.

GE 129 Refer to page N-46.

PW 220 Refer to page N-48.

GE 100 Refer to page N-50.

STRANGE FIELD PROCEDURES

Refer to Air Force/Command guidance.

EXTERIOR INSPECTION (TYPICAL)

NOTE: Check aircraft for loose doors and fasteners, cracks, dents, leaks, and other discrepancies.

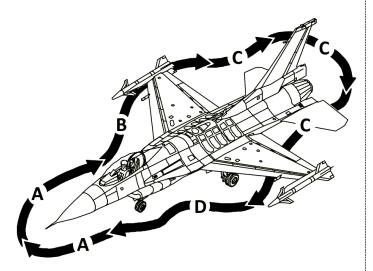


Figure N-3. (Sheet 1)

(Cont)

NOSE - A

- 1. FORWARD FUSELAGE:
 - A. EXTERNAL CANOPY JETTISON D-HANDLES (2) - ACCESS DOORS CLOSED.
 - B. PITOT-STATIC PROBES (2) COVERS REMOVED.
 - C. AOA PROBES (2) COVERS REMOVED; SLOTS CLEAR; FREEDOM OF MOVEMENT CHECKED; ALIGNMENT CHECKED (ROTATE PROBES FULLY TOWARD FRONT OF AIRCRAFT (CCW ON THE LEFT; CW ON THE RIGHT) AND VERIFY BOTTOM SLOTS SLIGHTLY AFT OF 6 O'CLOCK AND TOP SLOTS FORWARD); SET IN NEUTRAL POSITION (BOTTOM SLOT AT 4 O'CLOCK ON THE RIGHT SIDE AND 8 O'CLOCK ON THE LEFT SIDE).
 - D. STATIC PORTS (2) CONDITION.
 - E. RADOME SECURE.
 - F. ENGINE INLET DUCT CLEAR.
 - G. PODS AND PYLONS SECURE.
 - H. EPU ACTIVATED INDICATOR CHECK.
 - I. ECS RAM INLET DUCTS CLEAR.

CENTER FUSELAGE & RIGHT WING - B

- 1. RIGHT MLG:
 - A. TIRE, WHEEL, AND STRUT CONDITION.
 - B. LG SAFETY PIN INSTALLED.
 - C. DRAG BRACE AND OVERCENTER LOCK, BOLTS, NUTS AND COTTER KEYS -CHECK SECURITY.
 - D. UPLOCK ROLLER CHECK.
 - E. DOOR AND LINGAGE SECURE.

(Cont)

2. RIGHT WING:

- A. HYDRAZINE LEAK DETECTOR CHECK.
- B. EPU NITROGEN BOTTLE CHARGED
- C. EPU OIL LEVEL CHECK.
- D. HYD SYS A QTY AND ACCUMULATOR CHECK.
- E. GUN-RNDS COUNTER AND RNDS LIMIT SET.
- F. EPU EXHAUST PORT CONDITION.
- G. LEF CONDITION.
- H. STORES AND PYLONS SECURE.
- I. NAV AND FORM LIGHTS CONDITION.
- J. FLAPERON CONDITION.

AFT FUSELAGE - C

1. TAIL:

- A. ADG CHECK.
- B. CSD OIL LEVEL CHECK.
- C. BRAKE/JFS ACCUMULATORS CHARGED (3000 +/-100 PSI).
- D. HOOK CONDITION AND PIN FREE TO MOVE.
- E. VENTRAL FINS, SPEEDBRAKES, HORIZONTAL TAILS, AND RUDDER -CONDITION.
- F. ENGINE EXHAUST AREA CONDITION.
- G. ENGINE EXHAUST LINER CLEAR.
- H. NAV AND FORM LIGHTS CONDITION.
- I. VERTICAL TAIL LIGHT CONDITION.
- J. FLCS ACCUMULATORS CHARGED
- K. JFS DOORS CLOSED.

LEFT WING & CENTER FUSELAGE - D

1. LEFT WING:

- A. FLAPERON CONDITION.
- B. NAV AND FORM LIGHTS CONDITION.
- C. STORES AND PYLONS SECURE.
- D. LEF CONDITION.
- E. FUEL VENT OUTLET CLEAR.
- F. HYD SYS B QTY AND ACCUMULATOR -CHECK.

2. LEFT MLG:

- A. TIRE, WHEEL, AND STRUT CONDITION.
- B. LG SAFETY PIN INSTALLED.
- C. DRAG BRACE AND OVERCENTER LOCK, BOLTS, NUTS AND COTTER KEYS - CHECK SECURITY.
- D. UPLOCK ROLLER CHECK.
- E. DOOR AND LINGAGE SECURE.
- F. LG PIN CONTAINER CHECK CONDITION.

3. FUSELAGE:

- A. GUN PORT CONDITION.
- B. IFF CHECK.
- C. AVTR/DVR CHECK.
- D. DOOR 2317, ENGINE AND EMS GO-NO-GO INDICATORS CHECK.

4. UNDERSIDE:

- A. NLG TIRE, WHEEL, AND STRUT CONDITION.
- B. NLG PIN VERIFIED REMOVED.
- C. NLG TORQUE ARMS CONNECTED, PIN SECURE, AND SAFETIED.
- D. NLG DOOR AND LINGAGE SECURE.
- E. LANDING AND TAXI LIGHTS CONDITION.
- F. LG/HOOK EMERGENCY PNEUMATIC BOTTLE PRESSURE WITHIN PLACARD LIMITS.

EPU Nitrogen & Alternate LG/ Hook Bottles

Pneumatic Servicing

TEMPERATURE	PRESSURE
°F	PSIG
100 and higher	250-3500
50 to 100	2850-3250
10 to 50	2500-2850
-60 to +10	2000-2500

Figure N-41-A. EPU Nitrogen & Alternate LG/Hook Bottles

FLCS Accumulators Pneumatic Servicing

TEMPERATURE	PRESSURE
°F	PSIG
100 and higher	1300-1400
50 to 100	1200-1300
10 to 50	1100-1200
-60 to +10	950-1100

Figure N-41B. EPU Nitrogen & Alternate LG/Hook Bottles

AIRCRAFT SERVICING

SERVICING DIAGRAM

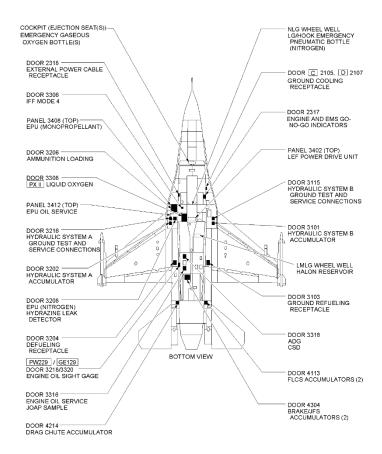


Figure N-4.

Takeoff and Landing Data Card

CONDITIONS

	TAKEOFF	LANDING
GW		
Runway		
Condition		
Runway Temp		
Pressure Altitude		
Wind		
Runway Length		
Runway Slope		

TAKEOFF

Rotation Speed		KIAS
Takeoff	KIAS	FEET
Speed/Dist.		
Refusal Speed		KIAS
Max Brake Speed		KIAS

LANDING

	lmr	nediately	Final	Landing
	Afte	er Takeoff		
	GW		GW	
Approach				
Speed				
Touchdown				
Speed				
Landing				
Distance				

Figure N-5.

ENGINE LIMITATIONS PW 229

ENGINE F100-PW-229

GROUND

				5555556
CONDITION	FTIT	RPM	OIL	REMARKS
	°C	%	PSI	
START	800			During cold start,
				oil pressure may
				be 100 psi for up
				to 1 minute
IDLE	625	65-77	15	Maximum FTIT in
			(min)	SEC is 650°C
MIL/AB	1070	97	30-95	At MIL and above,
				oil pressure must
				increase 15 psi
				minimum above
				IDLE oil pressure.
				Use transient rpm
				limit for takeoff
TRANSIENT	1090	98	30-95	Time above 1070°
				is limited to 10
				seconds
FLUCTUA-	±1	±1	±5	Must remain
TION			IDLE	within Steady-
				state limits. In-
				phase
				fluctuations of
				more than one
				instrument or
				fluctuations
				accompanied by
				thrust above IDLE
				surges indicate
				engine control
				problems. Nozzle
				fluctuations
				limited to ±2% at
				and above MIL.
				Fluctuations not
				permitted below
				MIL

ENGINE LIMITATIONS PW 229

ENGINE F100-PW-229

IN FLIGHT

CONDITION	FTIT	RPM	OIL	REMARKS
	°C	%	PSI	
AIRSTART	870			
IDLE			15	
			(min)	
MIL/AB	1070	97	30-95	Oil pressure
				must in-
				crease as rpm
				increases. Use
				transient rpm
				limit
				with LG handle
				DN and for 3
				minutes after LG
				handle is placed UP
TRANSIENT	1090	98	30-95	Time above
INANSIENI	1090	36	30-93	1070° is
				limited to 10
				seconds
FLUCTUA-	±10	±1	±5	Same as ground
TION			IDLE	operation. Zero
				oil pressure is
				allowable for
			±10	periods up
			above	above
			IDLE	to 1 minute
				during flight at
				less than +1g

ENGINE LIMITATIONS GE 129

ENGINE F110-GE-129

GROUND

CONDITION		2224	011	DENAADIKS
CONDITION	FTIT	RPM	OIL	REMARKS
	°C	%	PSI	
START	800			During cold start,
				oil pressure may
				be 100 psi for up
				to 1 minute
IDLE	625	65-77	15	Maximum FTIT in
			(min)	SEC is 650°C
MIL/AB	1070	97	30-95	At MIL and above,
				oil pressure must
				increase 15 psi
				minimum above
				IDLE oil pressure.
				Use transient rpm
				limit for takeoff
TRANSIENT	1090	98	30-95	Time above 1070°
				is limited to 10
				seconds
FLUCTUA-	±1	±1	±5	Must remain
TION			IDLE	within Steady-
				state limits. In-
				phase
				fluctuations of
				more than one
				instrument or
				fluctuations
				accompanied by
				thrust above IDLE
				surges indicate
				engine control
				problems. Nozzle
				fluctuations
				limited to ±2% at
				and above MIL.
				Fluctuations not
				permitted below
				MIL

ENGINE LIMITATIONS GE 129

ENGINE F110-GE-129

IN FLIGHT

			LIGITI	
CONDITION	FTIT	RPM	OIL	REMARKS
	°C	%	PSI	
AIRSTART	870			
IDLE			15	
			(min)	
MIL/AB	1070	97	30-95	Oil pressure
				must in-
				crease as rpm
				increases. Use
				transient rpm
				limit
				with LG handle
				DN and for 3
				minutes after LG
				handle is placed
TDANICIENT	4000	00	20.05	UP
TRANSIENT	1090	98	30-95	Time above
				1070° is limited to 10
				seconds
FLUCTUA-	±10	±1	±5	Same as ground
TION			IDLE	operation. Zero
11014			IDLL	oil pressure is
				allowable for
			±10	periods up
			above	above
			IDLE	to 1 minute
				during flight at
				less than +1g

ENGINE LIMITATIONS PW 220

ENGINE F100-PW-220

GROUND

CONDITION	FTIT	RPM	OIL	REMARKS
	°C	%	PSI	
START	800			During cold start,
				oil pressure may
				be 100 psi for up
				to 1 minute
IDLE	625	65-77	15	Maximum FTIT in
			(min)	SEC is 650°C
MIL/AB	1070	97	30-95	At MIL and above,
				oil pressure must
				increase 15 psi
				minimum above
				IDLE oil pressure.
				Use transient rpm
				limit for takeoff
TRANSIENT	1090	98	30-95	Time above 1070°
				is limited to 10
				seconds
FLUCTUA-	±1	±1	±5	Must remain
TION			IDLE	within Steady-
				state limits. In-
				phase
				fluctuations of
				more than one
				instrument or
				fluctuations
				accompanied by
				thrust above IDLE
				surges indicate
				engine control
				problems. Nozzle
				fluctuations
				limited to ±2% at
				and above MIL.
				Fluctuations not
				permitted below
				MIL

ENGINE LIMITATIONS PW 220

ENGINE F100-PW-220

IN FLIGHT

			LIGITI	
CONDITION	FTIT	RPM	OIL	REMARKS
	°C	%	PSI	
AIRSTART	870			
IDLE			15	
			(min)	
MIL/AB	1070	97	30-95	Oil pressure
				must in-
				crease as rpm
				increases. Use
				transient rpm
				limit
				with LG handle
				DN and for 3
				minutes after LG
				handle is placed
TD ANGLES IT	4000		20.05	UP
TRANSIENT	1090	98	30-95	Time above
				1070° is
				limited to 10 seconds
FLUCTUA-	±10	±1	±5	Same as ground
TION	110		IDLE	operation. Zero
HON			IDLL	oil pressure is
				allowable for
			±10	periods up
			above	above
			IDLE	to 1 minute
				during flight at
				less than +1g

ENGINE LIMITATIONS GE 100

ENGINE F110-GE-100

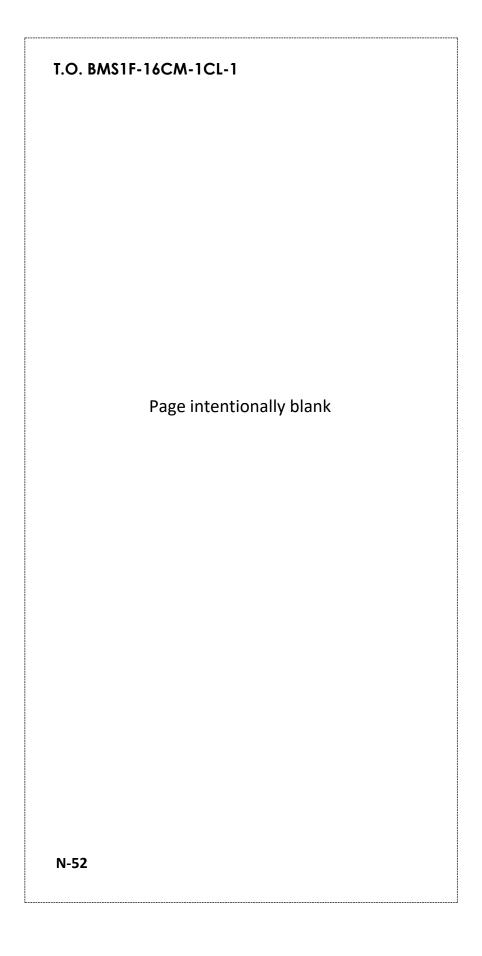
GROUND

CONDITION		2224	011	DENAADIKS
CONDITION	FTIT	RPM	OIL	REMARKS
	°C	%	PSI	
START	650			During cold start,
				oil pressure may
				be 100 psi for up
				to 1 minute
IDLE	625	65-77	15	Maximum FTIT in
			(min)	SEC is 650°C
MIL/AB	1070	97	30-95	At MIL and above,
				oil pressure must
				increase 15 psi
				minimum above
				IDLE oil pressure.
				Use transient rpm
				limit for takeoff
TRANSIENT	1090	98	30-95	Time above 1070°
				is limited to 10
				seconds
FLUCTUA-	±1	±1	±5	Must remain
TION			IDLE	within Steady-
				state limits. In-
				phase
				fluctuations of
				more than one
				instrument or
				fluctuations
				accompanied by
				thrust above IDLE
				surges indicate
				engine control
				problems. Nozzle
				fluctuations
				limited to ±2% at
				and above MIL.
				Fluctuations not
				permitted below
				MIL

ENGINE LIMITATIONS GE 100 *ENGINE F110-GE-100*

IN FLIGHT

CONDITION	FTIT	RPM	OIL	REMARKS
	°C	%	PSI	
AIRSTART	870			
IDLE			15	
			(min)	
MIL/AB	1070	97	30-95	Oil pressure
				must in-
				crease as rpm
				increases. Use
				transient rpm
				limit
				with LG handle
				DN and for 3 minutes after LG
				handle is placed
				UP
TRANSIENT	1090	98	30-95	Time above
				1070° is
				limited to 10
				seconds
FLUCTUA-	±10	±1	±5	Same as ground
TION			IDLE	operation. Zero
				oil pressure is
				allowable for
			±10	periods up
			above	above to 1 minute
			IDLE	during flight at
				less than +1g
	l		l	1000 (11011 1 15





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PRESS

Pilot Fault List — Engine PW 229

FAULT	CAUS E	CORRECTIVE ACTION/REMARKS
ENG A/B FAIL and ENG THST LOW	Engine hardware deterioration/de -tected performance loss	Reduce engine rpm to 85% or less, unless required to sustain flight. High thrust lev- els may result in fur- ther deterioration/per- formance loss. Land as soon as possible
ENG A/I TEMP	Anti-ice valve failedopen and/or bleed air temperature greater than 850F	Reduce throttle setting to midrange unless required to sustain flight. Operating the engine above midrange with anti-ice system failed on may result in engine stall. Position the engine ANTI ICE sw to OFF, conditions permitting. Land as soon as practical. Avoid areas of known or suspected icing conditions
ENG A/I FAIL	Engine anti- icevalve failed in closed position	Avoid areas of knownor suspected icing conditions
ENG MACH FAIL	The CADC supplied mach number to the DEEC is no lon- ger available	Supersonic stall protection is inoperative. Do not retard throttle below MIL while supersonic. If CADC caution light is also on, refer to CADC MALFUNCTION, page B-7
ENG A/B FAIL	AB system failuredetected	AB RESET sw — AB RE- SET. Land as soon as practical if fault does not clear. AB opera- tion is partially or fully inhibited

Pilot Fault List — Engine PW 229

FAULT	CAUSE	CORRECTIVE ACTION/REMARKS
ENG THST LOW	Loss of redundant FTIT signals received by DEEC	MIL rpm is reduced 7percent by DEEC
	DEEC has detecteda failed open or missing nozzle	If a failed open or missing nozzle is suspected, refer to NOZZLE FAILURE, page C-25
ENG BUS FAIL	Communication lost between engine and aircraft MUX bus	Illuminates AVIONICS FAULT caution light. A subsequent engine fault causes a non- resettable ENGINE FAULTcaution light and is notdisplayed on the PFLD
ENG PFL DEGR	Communication lost between diagnostic and control portions of the engine	Do not retard throttlebelow MIL while supersonic. May be accompanied by anauto transfer to SEC. After ENG PFL DEGR/ ENG 089, only ENG A/I TEMP/ENG 084 can be subsequently displayed

^{*} Refer to ENGINE FAULT CAUTION LIGHT, page C-29.

NOTE A short duration fault condition may cause display of a PFL without illumination of the ENGINE FAULT caution light.

Pilot Fault List — Engine GE 129

FAULT	CAUSE	CORRECTIVE ACTION/REMARKS
ENG LUBE LOW	Oil quantity below preset limit	Refer to OIL SYSTEM MALFUNCTION, page C-19
ENG A/I FAIL	Engine anti-ice valve failed in closed position or indication malfunction	Avoid areas of knownor suspected icing conditions
ENG MACH FAIL	The CADC sup- plied mach num- ber to the DEC is no longer avail- able	Supersonic stall protection is inoperative. Do not retard throttle below MIL while super-sonic. If CADC caution light is also on, refer to CADC MALFUNC-TION, page B-7
ENG BUS FAIL	Communication between engine and MUX bus lost	Illuminates AVIONICS FAULT caution light. Other engine PFL's cannot be displayed
ENG A/B FAIL	AB system failure detected	Land as soon as practical if fault does not clear. AB operation inhibited. If nozzle re- mains closed at idle below 0.5 mach, refer to ABNORMAL ENGINERESPONSE, page C-23
ENG EMS FAIL	Data transmission from DEC lost BIT/self-test received from DEC indicates a failure EMSC BIT/selftest detects a failure	Other PFL's either can- not be displayed or, if displayed, are not reli- able

Pilot Fault List — Engine GE 129

FAULT	CAUSE	CORRECTIVE ACTION/REMARKS
ENG HYB MODE	A PRI fuel flow scheduling prob lem was detected	Supersonic stall protection is inoperative. Do not retard throttle below MIL while super-sonic. Check engine response to throttle movement when sub-sonic. If engine responds normally, land as soon as practical. If engine does not respond normally, refer to ABNORMAL ENGINE RESPONSE, page C-23

NOTE A short duration fault condition may cause display of a PFL without illumination of the ENGINE FAULT caution light.

Pilot Fault List — Engine PW 220

FAULT	CAUSE	CORRECTIVE ACTION/REMARKS
ENG A/I TEMP	Anti-ice valve failed open and/orbleed air temperature greater than 850°F	Reduce throttle settingto midrange unless required to sustain flight. Operating the engine above midrange with anti-icesystem failed on may result in engine stall. Land as soon as practical
ENG A/I FAIL	Engine anti-ice valve failed in closed position	Avoid areas of knownor suspected icing conditions
ENG MACH FAIL	The CADC supplied mach number to the DEEC is no longer available	Supersonic stall protection is inoperative. Do not retard throttle below MIL while supersonic. If CADC caution light is also on, refer to CADC MALFUNC- TION, page B-7
ENG A/B FAIL	AB system failure detected	AB RESET sw — AB RE- SET. Land as soon as practical if fault does not clear. AB operation is partially or fullyinhibited
ENG THST LOW	Loss of redundant FTIT signals received by DEEC	MIL rpm is reduced 7 percent by DEEC
	DEEC has detecteda failed open or missing nozzle	If a failed open or missing nozzle is sus- pected, refer to NOZZLE FAILURE, page C-25

Pilot Fault List — Engine PW 220

FAULT ENG BUS FAIL	CAUSE Communication	CORRECTIVE ACTION/REMARKS Illuminates
	lost between LESS EDU, DEEC and MUX bus	AVIONICS FAULT caution light. A subsequent engine fault causes a non-resettable ENGINE FAULT caution light and is not displayed on the PFLD
ENG PFL DGRD	LESS Com- munication lost between EDU and DEEC, The DEEC engine diagnostic unit is inoperative	Do not retard throttlebelow MIL while supersonic. Only ENG A/I TEMP PFL can subsequently be displayed

NOTE A short duration fault condition may cause display of a PFL without illumination of the ENGINE FAULT caution light.

Pilot Fault List — Engine GE 100

FAULT	CAUSE	CORRECTIVE ACTION/REMARKS	
ENG LUBE LOW	Oil quantity below preset limit	Refer to OIL SYSTEM MALFUNCTION, page C-19	
ENG A/I FAIL	Engine anti-ice valve failed in closed position or indication malfunc- tion	Avoid areas of known or suspected icing conditions	
ENG MACH FAIL	The CADC supplied mach number to the DEC is no longer available, or engine in HYB	Supersonic stall protection is inoperative. Do not retard throttle below MIL while supersonic If accompanied by ENG 023 MFL, the engine is in HYB. Check engine response to throttle movement when subsonic. If engine responds normally, land as soon as practical. If engine does not respond normally, refer to ABNORMAL ENGINE RESPONSE, page C-23 If CADC caution lightis also on, refer to CADC MALFUNCTION, page B-7 If CADC caution lightis not on or was resetand ENG 023 MFL is not present, mission may be continued. Do not retard throttle below MIL while supersonic	
ENG BUS FAIL	Communication between engine and MUX bus lost	Illuminates AVIONICS FAULT caution light. Other engine PFL's cannot be displayed	

Pilot Fault List — Engine GE 100

FAULT	CAUSE	CORRECTIVE ACTION/REMARKS
ENG A/B FAIL	AB system failure detected	Land as soon as practical if fault does not clear. AB operation inhibited. If nozzle remains closed at idle below 0.5 mach, refer to ABNORMAL ENGINE RESPONSE page C-23

NOTE A short duration fault condition may cause display of a PFL without illumination of the ENGINE FAULT caution light.

Pilot Fault List — FLCS

(FLCS warning light illuminated)

FAULT	CAUSE	CORRECTIVE ACTION/REMARKS
FLCS AOA WARN	Dual AOA failure	Refer to AOA MALFUNCTION, page B-5
FLCS DUAL FAIL	Dual electronic, sensor, or powerfailure in one ormore axes	Refer to FLCS DUAL ELECTRONIC FAILURE, page B-15
FLCS LEF LOCK	LEF's are locked due to multiple failures, LE FLAPSswitch position, or asymmetry	Refer to LEF MAL- FUNCTION, page B-11
STBY GAIN	Dual air data failure	Refer to AIR DATA MALFUNCTIONS, page B-9
FLCS BIT FAIL	FLCS BIT has detected a failure	Perform a second FLCS BIT. If fault doesnot clear, notify maintenance. Fault only occurs on ground



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EP-16

Pilot Fault List — FLCS

(FLCS FAULT caution light illuminated for all)

FAULT	CAUSE	CORRECTIVE ACTION/REMARKS
FLCS ADC FAIL	First failure of triplex air data inputsignal	Refer to AIR DATA MALFUNCTIONS, page B-9
FLCS AOA FAIL	First failure of triplex AOA input signal	Refer to AOA MALFUNCTION, page B-5
FLCS AOS FAIL	AOS feedback function is inop-erative due to failure	Perform FLCS reset to attempt to clear fault; fault cannot be reset if INS or CADC is failed
		If fault does not clear,the autopilot cannot be engaged. Position the STORES CONFIG sw to CAT III*
FLCS FLUP OFF	MANUAL TF FLYUP sw moved to DIS-ABLE	Position the MANUAL TF FLYUP sw as re- quired. A FLCS reset extinguishes FLCS FAULT caution light
	FLCS BIT detects MANUAL TF FLYUP sw in DISABLE	Position MANUAL TF FLYUP sw to ENABLE. Rerun FLCS BIT
FLCS A/P DEGR	Autopilot operating outside of attitude limits or unable to hold commanded mode	Autopilot is inoperative

NOTE *The potential for a departure from controlled flight is significantly increased if the AOS feedback function is inoperative and maneuvering occurs with the STORES CONFIG sw in CAT I.

Pilot Fault List — FLCS

(FLCS FAULT caution light illuminated for all except FLCS BUS FAIL)

FAULT	CAUSE	CORRECTIVE ACTION/REMARKS
FLCS A/P FAIL	Autopilot has disconnected or cannot be engaged due to loss of needed data	Refer to AUTOPILOT MALFUNCTIONS, page B-17
FLCS BUS FAIL	Communication lost between FLCC and MUX bus	Illuminates AVIONICS FAULT caution light. Other FLCS PFL's may not be displayed on the PFLD. Refer to FLCS page on MFD for FLCS PFL's
BRK PWR DEGR	Power supply failure detected in one or more branches	Refer to FLCS SINGLE ELECTRONIC FAILURE, page B-15
FLCS CCM FAIL	Erroneous output command detected by CCM	Refer to FLCS SINGLE ELECTRONIC FAILURE, page B-15
FLCS HOT TEMP	FLCC sensors detect two branches in excess of 75C	Refer to FLCS TEMPERATURE MALFUNCTIONS, page B-13
ISA ALL FAIL	Two or more ISA's have reported a first servo valve failure	Refer to SERVO MAL-FUNCTION, page B-17

Pilot Fault List — FLCS

(FLCS FAULT caution light illuminated for all)

FAULT	CAUSE	CORRECTIVE ACTION/REMARKS
ISA LHT FAIL ISA RHT FAIL ISA LF FAIL ISA RF FAIL ISA RF FAIL	Indicated ISA has reported a first servo valve failure	Refer to SERVO MALFUNCTION, page B-17
FLCS SNGL FAIL	Indicates single electronic or sen- sor failure in one or more axes	Notify maintenance. Fault only occurs on ground
FLCS MUX DEGR	BIT detected deg- radation of FLCC MUX interface	FLCS reset will not clear fault. Perform a second FLCS BIT. If fault does not clear and no other faults are reported, thesystem redundancy is adequate for flight. Notify maintenance after flight. Fault only occurs on ground

T.O. BMS1F-16CM-1CL-1 NOTES: **EP-20**

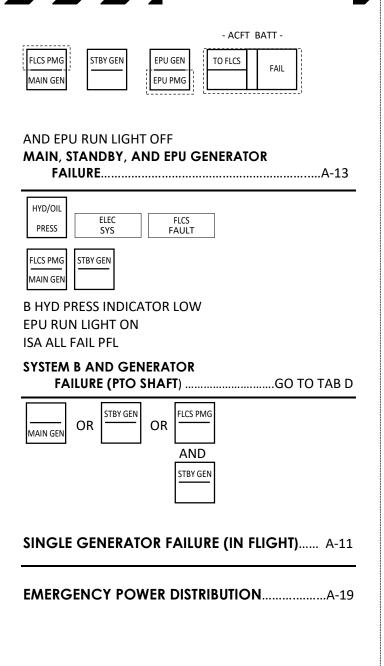
GLOSSARY



FLCS PMG Dash line indicates light may be on or off

Electrical System Failures

PARTIAL ELECTR	PARTIAL ELECTRICAL POWER LOSSA-7					
ELEC SYS	Refer to ELEC control panel.					
—ACFT BATT—	ACFT BATTERY FAILUREA-9					
FLCS RLY	FLCS RLY LIGHTA-11					
AND EPU RUN LIGHT OFF OR FLASHING	EPU MALFUNCTIONS A-17					
FLCS PMG	FLCS PMG FAILURE A-9					
MAIN GEN AND STBY GEN	MAIN AND STANDBY GENERATOR FAILURE (GROUND)A-5 (IN FLIGHT)A-15					



- 1 Turn EPU on, if required, to obtain NWS.
- **2** C If chocks are not installed, be prepared to immediately engage the parking brake if it disengages when the EPU is shut off.
- **3** Toe brakes and parking brake are available with or without the EPU as long as the MAIN PWR sw is not moved to OFF.
- **4 C** If main or standby generator cannot be reset, NWS is inoperative unless the EPU is activated.

MAIN AND STANDBY GENERATOR FAILURE (GROUND)

If MAIN GEN and STBY GEN lights illuminate:

- 1. Stop the aircraft. 1
- 2. ANTI-SKID sw PARKING BRAKE.
- 3. OXYGEN 100%.
- 4. EPU sw OFF. 2 C

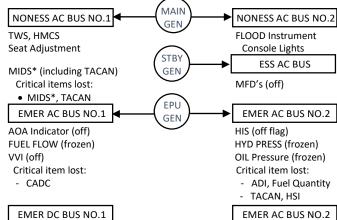
If further taxiing is required:

- 1. ELEC CAUTION RESET button Depress. 3
- 6. Refer to ACTIVATED EPU/HYDRAZINE LEAK, page F-13.

OTHER CONSIDERATIONS:

1 If possible, verify the status of aircraft systems required for landing in advance.

2 40/42 May reset overcurrent protection unit(s). 50/52 The failed open OCSC may reset.



EMER DC BUS NO.1

AOA Indexer Speedbrakes VHF Radio

Critical items lost:

- LG DOWN Permission Button (DN LOCK REL Button required)
- LG WHEELS Down Lights
- EGI (7-10 sec of use)
- TACAN



RPM (indicates < zero)

UHF Radio

*VHF Radio

Critical items lost:

- Channel 1 Brakes
- LG WHEELS Down Lights

Critical items lost:

- Parking Brake
- Hook

**SAI (off flag)

Autopilot HUD

SEAT NOT ARMED

Critical items lost:

Command (ALT GEAR

extension required)

Caution Light

- LG UP-DN

- ILS

- LG Warning Light (handle)

^{*}VHF radio is also inoperative because the intercom is not powered.

^{** (}Not implemented in BMS).



ELECTRICAL POWER CYCLING

If cycling occurs:

- 1. ST STA sw OFF.
- 2. Monitor aircraft systems.
- 3. Land as soon as possible. 1

PARTIAL ELECTRICAL POWER LOSS

1. ELEC CAUTION RESET button – Depress. 2

If power is restored:

2. Land as soon as practical.

(Cont)

- **3** Refer to the following diagram to determine the power status of individual buses. If one item on a bus is powered, then that bus should be considered powered.
- **4** ◆ Determining the status of the battery buses is critical for a safe recovery of the aircraft.
- ◆ The hook will remain down and be capable of engaging a cable until very low battery bus voltage (approx 5 vdc); however, if battery bus power is completely lost, the hook will not remain fully down.
- **5** ◆ The nonessential dc buses and essential dc bus lose power. This results in loss of power to fuel boost and transfer pumps, CARA, ECM, and FCR and power for normal weapon arming/release including selective jettison.
- ◆ If the affected systems are required for the safe recovery of the aircraft, consider delaying/terminating EPU operation until the systems are no longer required.
- **6** If power to the battery buses is lost after the landing gear has been extended, the landing gear cannot be raised.

If power is not restored:

2. Determine the power status of electrical buses. **3** 4

If one or both emergency ac buses are not powered:

3. EPU sw – ON. **5**

If the battery buses and emergency dc bus No. 2 are not powered:

4. Consider a net arrestment, refer to NET ARRESTMENT, page F-13.

If net arrestment is not available:

- 5. Consider a gear up landing, refer to LANDING WITH LK UNSAFE/UP, page E-15. 6
- 6. Refer to EMERGENCY POWER DISTRIBUTION, page A-19.
- 7. Land as soon as possible.

If EPU was activated:

8. Refer to ACTIVATED EPU/HYDRAZINE LEAK, page F-13.

END

OTHER CONSIDERATIONS:

- 1C If the aircraft battery has failed (and EPU is off), do not taxi except to clear runway. Subsequent loss of the main and standby generators results in loss of all braking, NWS, hook and radios.
- The nonessential dc buses and essential dc bus lose power. This results in loss of power to the fuel boost and transfer pumps, 40/42 ASHM, CARA, ECM, TWS, and FCR and power for normal weapon arming/release including selective jettison.
- ◆ If the affected systems are required for the safe recovery of the aircraft, consider delaying/terminating EPU operation until the systems are no longer required.
- ◆ If battery bus powered equipment begins to operate in a degraded manner or is inoperative, place HOOK sw down and refer to PARTIAL ELECTRICAL POWER LOSS, page A-7.
- ◆The ACFT BATT FAIL light may subsequently extinguish. This should not be interpreted to mean that the battery has recharged. It may indicate that the battery voltage is so low that the light cannot remain illuminated.

AIRCRAFT BATTERY FAILURE 1C

- 1. EPU sw ON. **2**
- 2. Land as soon as practical.
- 3. Refer to ACTIVATED EPU/HYDRAZINE LEAK, page F-13.

If EPU runs abnormally:

- 4. EPU sw OFF, then NORM.
- 5. Land as soon as possible.
- 6. Refer to ACTIVATED EPU/HYDRAZINE LEAK, page F-13.

Prior to shut down:

- 7. Loose items Secure.
- 8. Canopy Open.

FLCS PMG FAILURE

If FLCS PMG light illuminates:

1. Land as soon as practical.

END

OTHER CONSIDERATIONS:

- 1 With standby generator failure and the MAL & IND LTS sw in DIM, the ELEC SYS caution light may not appear to illuminate when the MASTER CAUTION and STBY GEN lights illuminate.
- The TACAN is not powered when the main generator is offline.
- 2 This action may reset the main or standby generator. Cycling the MAIN PWR sw may also reset the main generator; however, this action momentarily removes standby generator power and activates the EPU.
- While operating on standby generator with NVP powered, do not exceed 5000 ft MSL and do not exceed 25 minutes NVP operating time.
- 4 C Illumination of the MAIN GEN light after a 2-3 second loss of power to the HUD, MFD's, and other cockpit instruments indicates shorting failure of an OCSC or other wiring/equipment.

SINGLE GENERATOR FAILURES (IN FLIGHT) 40/42 1

If MAIN GEN, STBY GEN, or STBY GEN and FLCS PMG lights illuminate:

1. ELEC CAUTION RESET button - Depress. 2

2. Land as soon as practical. 3 C

SINGLE GENERATOR FAILURES (IN FLIGHT) 50/52 4 C 1

If MAIN GEN light illuminated | If MAIN GEN light after a 2-3 sec loss of the **HUD** and MFD's was observed:

1. Land as soon as practical.

When ready to land:

2. EPU sw - ON.

After verif EPU RUN light is on and EPU PMG and EPU GEN lights are off:

- 3. MAIN PWR sw-BATT.
- 4. Refer to ACTIVATED EPU/HYDRAZINE LEAK, page F-13.
- 5. If hydrazine depletes or EPU run light goes off at low thrust - Go to ABNORMAL EPU OPERATION, page A-17.

illuminated and a 2-3 sec loss of the HUD and MFD's was not observed, or if STBY GEN or STBY GEN and **FLCS PMK lights** illuminate:

- 1. ELEC CAUTION RESET button -Depress. 2
- 2. Land as soon as practical.

FLCS RLY Light

1. FLCS PWR TEST sw - TEST, momentarily.

If FLCS RLY light goes off:

2. Land as soon as practical. (Cont)

A-11

OTHER INDICATIONS:

The nonessential dc buses and essential dc bus lose power. This results in loss of power to fuel boost and transfer pumps, 40/42 ASHM, CARA, ECM, TWS, and FCR and power for normal weapon arming/release including selective jettison.

• If the affected systems are required for the safe recovery of the aircraft, consider delaying/terminating EPU operation until the systems are no longer required.



If FLCS RLY light remains on:

- 2. EPU sw ON. **5**
- 3. Land as soon as practical.
- 4. Refer to ACTIVATED EPU/HYDRAZINE LEAK, page F-13.

If EPU runs abnormally:

- 3. EPU sw OFF, then NORM.
- 4. Land as soon as possible.

END

OTHER INDICATIONS:

Main, standby, and EPU generators inoperative:

- Avionics inoperative.
- Uncontrollable cold airflow into the cockpit or reduced airflow to the cockpit if the water separator coalescer freezes up.
- · ADI AUX warning flag.
- ADI OFF warning flag.

MAJOR INOPERATIVE EQUIPMENT:

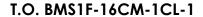
Main, standby, and EPU generators inoperative:

- Normal LG extension.
- LEF's, speedbrakes, stick trim.
- FUEL quantity/FUEL FLOW indicators.
- Fuel boost and transfer pumps.
- Stores jettison (SEL and EMER).
- ADI, AOA, IFF, INS, TACAN, and VHF.
- Go to EMERGENCY POWER DISTRIBUTION, page A-19, for other systems lost.

OTHER CONSIDERATIONS:

- **1 W** With a main, standby, and EPU generator failure, OBOGS and the OXY LOW warning light are inoperative. Activate EOS if above 10,000 ft cockpit altitude.
- 2 The TACAN is not powered when the main generator is off line.
- **W** LEF's are inoperative and departure susceptibility may be increased. Near 1g flight, 200 kts should keep AOA less than 12°. Limit rolling maneuvers to a max bank angle change of 90° and avoid rapid roll rates.
- 4 This action may reset the main and/or standby generator.
- 5 This action may reset the main generator.

A-12.2



MAIN, STANDBY, AND EPU GENERATOR FAILURE

If MAIN GEN, STBY GEN, and EPU GEN lights illuminate: 1 w 2

- 1. AOA 12° max (200 kts minimum). 3 W
- 2. EPU sw ON (if EPU run light is off).
- 3. Climb if necessary.
- 4. Throttle As required to extinguish the HYDRAZN light.

If EPU GEN light goes off:

5. Go to MAIN AND STANDBY GENERATOR FAILURE (IN FLIGHT), page A-15.

If EPU GEN light is still on:

6. ELEC CAUTION RESET button – Depress. 4

If both MAIN GEN and STBY GEN lights remain on:

7. MAIN PWR sw – BATT, then MAIN PWR. 5

(Cont)

OTHER CONSIDERATIONS:

6C PW 220 DEEC stall protection may be lost. Do not retard throttle below MIL until subsonic.

7 W ◆ Emergency jettison is not available unless the main, standby, or EPU generator is operating.

- ◆ Plan to land within 30 minutes to ensure adequate electrical power for communications, brakes and hook.
- ◆ If the FLCS PMG and EPU PMG lights are on in combination with the ACFT BATT TO FLCS light, the aircraft battery is powering the FLCS. With the aircraft battery powering the FLCS in addition to the battery buses, approx 3-14 minutes' flight time is available.
- ◆ When the FLCS is powered by aircraft battery, remain alert for degraded flight controls. At the first indication of degraded response, reduce airspeed and climb to safe ejection altitude. Eject prior to complete loss of control.
- **8** Fly airspeed for 11° AOA approach using fuel state when power was lost.

9 W If LG handle does not lower, select BRAKES CHAN 2 and position ALT FLAPS sw to EXTEND. PW 220 / PW 229 Nozzle remains closed, resulting in higher than normal landing thrust.

- **10** ◆ Alternate LG extension can be used up to 300 kts; however, the NLG may not fully extend until 190 kts. Time above 190 kts should be minimized in case there is a leak in the pneumatic lines.
- ♦ WHEELS down lights and TO/LDG CONFIG warning light function are inoperative. Monitor LG handle warning light to verify that LG is down.
- **11** C → NWS is not available following alternate LG extension.
- ◆ Do not depress the ALT GEAR reset button while pulling the ALT GEAR handle. This action may preclude successful LG extension.
- ◆ Pulling the ALT GEAR handle with normal system B hydraulic pressure may result in system B hydraulic failure within 15 minutes.

If either MAIN GEN or STBY GEN light goes off:

- 8. PW 220 AB
 RESET sw AB
 RESET, then
 NORM. 6 C
- 9. EPU sw OFF, then NORM.
- 10. Land as soon as possible.
- 11. Refer to
 ACTIVATED
 EPU/HYDRAZINE
 LEAK, page F-13.

END

If MAIN GEN, STBY GEN, and EPU GEN lights all remain on or all come on again: **7 W**

- 8. HOOK sw DN.
- 9. C & I knob BACKUP.
- 10. Minimize UHF transmissions.

If conditions permit:

- 11. Land as soon as possible. **8**
- 12. LG handle DN. (Use DN LOCK REL button. 9 W
- 13. ALT GEAR handle Pull (190 kts max).

 10 11C
- 14. Consider an approach end arrestment, if conditions permit. Refer to CABLE ARRESTMENT, page F-13.
- 15. Refer to ACTIVATED EPU/HYDRAZINE LEAK, page F-13.

After landing:

- 16. Stop straight ahead and have chocks installed (or engage parking brake).
- 17. MAIN PWR sw -MAIN PWR (until chocks are installed).

END

A-14-1

MAJOR INOPERATIVE EQUIPMENT:

- Fuel boost and transfer pumps.
- Go to EMERGENCY POWER DISTRIBUTION, page A-19, for other systems lost.

OTHER INDICATIONS:

- Numerous caution lights.
- Caution lights come on bright, if dimmed.

OTHER CONSIDERATIONS:

- 1 The TACAN is not powered when the main generator is offline.
- 2 This action may reset the main and/or standby generator. The MAIN PWR sw may also be cycled to reset the main generator.
- 3 If warning flag(s) is in view, refer to EGI FAILURE, page F-29.
- 4 W If only AUX flag is in view, pitch and roll attitude information is likely to be erroneous due to INS autorestart in the attitude mode when other than straight and level, unaccelerated flight conditions existed.
- **DEEC** stall protection may be lost. Do not retard throttle below MIL until subsonic.
- **6 C** If chocks are not installed, be prepared to immediately engage the parking brake if it disengages when the EPU is shut off.

MAIN AND STANDBY GENERATOR FAILURE (IN FLIGHT) 1

If MAIN GEN and STBY GEN lights illuminate:

- 1. EPU sw ON (if EPU run light is off).
- 2. ELEC CAUTION RESET button Depress. 2

If MAIN GEN or STBY GEN light goes off:

- 3. EPU sw OFF, then NORM.
- 4. ADI Check for presence of OFF and/or AUX warning flags. 3 4 W
- 5. **PW 220** AB **RESET sw - AB** RESET, then NORM. 5 C
- 6. Land as soon as practical.
- 7. Refer to **ACTIVATED** EPU/HYDRAZINE LEAK, page F-13.

END

If MAIN GEN and STBY GEN lights remain on:

- 3. ADI Check for presence of OFF and/or AUX warning flags. 3 4 W
- 4. **PW 220** AB RESET sw -AB RESET, then NORM. 5 C
- 5. Land as soon as possible.
- 6. Refer to ACTIVATED EPU/HYDRAZINE LEAK, page F-13.
- 7. If hydrazine depletes or EPU run light goes off at low thrust to **ABNORMAL EPU** OPERATION, page A-17.

After landing and aircraft is stopped:

- 8. Chocks Installed (or parking brake engaged).
- 9. EPU sw OFF. 6 C
- 10.MAIN PWR sw MAIN PWR (until chocks are installed).

END

OTHER CONSIDERATIONS:

1 The nonessential dc buses and essential dc bus may lose power. If so, this results in loss of power to fuel boost and transfer pumps, CARA, ECM, and FCR and power for normal weapon arming/release including selective jettison.

2 Only if required to maintain low thrust.

The nonessential dc buses and essential dc bus lose power. This results in loss of power to the 40/42 ASHM, fuel boost and transfer pumps, CARA, ECM, and FCR and power for normal weapon arming/release including selective jettison.

 If the affected systems are required for the safe recovery of the aircraft, consider delaying/terminating EPU operation until the systems are no longer required.

4 Keep thrust high enough to assure adequate bleed air if EPU fuel usage continues above PW 220 / PW 229 80, GE 100 / GE 129 90 percent rpm or if EPU run light is flashing. If EPU fuel is depleted or if EPU run light goes off at low thrust, set throttle to keep EPU run light on.

Make an approach end arrestment, if practical, if EPU fuel depletes before landing or if EPU run light goes off at low thrust settings. Refer to CABLE ARRESTMENT, page F-11.

6 W Before landing, confirm that the EPU operates (EPU run light is on) with the throttle in IDLE. If the EPU run light goes off, immediately advance the throttle and maintain a throttle setting which keeps EPU run light on until after touchdown.

7 C If EPU underspeeds, electrical bus cycling may affect brake operation. For a missed engagement, attempt CHAN 1 then CHAN 2 brakes. If no braking is available, consider going around for another engagement or making a departure-end arrestment. The parking brake still operates.



EPU MALFUNCTIONS

Uncommanded EPU Operation

If uncommanded EPU operation occurs and AIR light is off (bleed air valve failure): $\boxed{1}$

- 1. Throttle Minimum practical thrust.
- 2. Stores Jettison (if required). 2
- 3. Land as soon as possible.

If AIR light is on (and EPU is operating normally): 3

- 1. EPU Leave running.
- 2. Land as soon as possible.
- 3. Refer to ACTIVATED EPU/HYDRAZINE LEAK, page F-13.

Abnormal EPU Operation

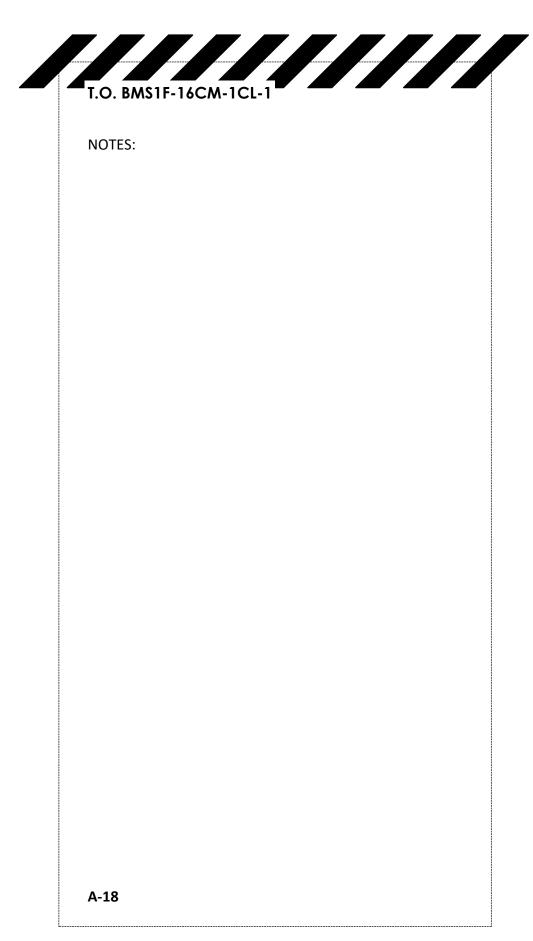
If EPU was turned on for an ACFT BATT FAIL or an FLCS RLY light:

- 1. EPU sw OFF, then NORM.
- 2. Land as soon as possible.
- 3. Refer to ACTIVATED EPU/HYDRAZINE LEAK, page F-13.

If EPU was activated for other reasons:

- 1. Throttle As required (**PW 220** / **PW 229** 75-80, **GE 100** / **GE 129** 82-90 percent rpm). 4
- 2. EPU FUEL quantity Monitor.
- 3. Land as soon as possible. 5 6 W 7 C
- 4. Refer to ACTIVATED EPU/HYDRAZINE LEAK, page F-13.

END



Emergency Power Distribution

MAIN GENERATOR FAILED

		BUS ASSIGNMENT				
SYSTEM	INOPERATIVE EQUIPMENT	NONES	NONESS AC		NACELLE NONESS DC	
		NO. 1	NO. 2	NO. 1	NO. 2	
ENGINE	PW 220 MAX POWER				х	
	PW 229 GIT (LG handle down)	X(FCC)				
	GE 100 / GE 129 EMSC				х	
NAV/COMM	****MIDS LVT (including TACAN)	Х		3	*	
	Pumps I, 2, 4 & 5		Х	•	*	
FUEL	GE 100 / GE 129 FUEL/OIL HOT Caution Light (oil hot signal)				х	
	AIM-9/-120	**	***			
STORES MGT	Stations 3, 5, & 7 – ECM, EO, Radar - Guided Weapons	*	**			
	Stations 4 & 6 – EO, Radar - Guided Weapons		Х			
AVIONICS	DTU		Х			
	FCR	Ra	dar	*		
	GPS	Х				
	Right Inlet Station				Х	
	HMCS	Х				
	TWS	Х		Х		
LIGHTS	Flood Console		Х			
	Flood Instrument		Х			
	Formation		Х			
	Taxi		Х			
OTHER	ECM Control			-	*	
	Halon Heater		Х			
	Inlet Strut heater		Х			
	INS Heater	Х				
	Nacelle Ejector Shutoff				Х	
	Seat Adjustment	Х				
	Total Tamp Probe Heater	Х				

^{*} Aft equipment bay nonessential dc bus.

functional with the MAIN GEN light On (bus contactor failure).

^{**} Block 40/42 Overcurrent protection panel No. 1.
** Block 50/52 Overcurrent sensing contactors.

^{***} Nacelle nonessential ac bus.

^{****} Not implemented in BMS.



Emergency Power Distribution

MAIN GENERATOR FAILED
(All equipment from page A-19 plus the following:)

	INOPERATIVE	BUS ASSIGNMENT		
SYSTEM	EQUIPMENT	ESS AC	ESS DC	
FUEL	Pump 3 & 5	Х	Х	
	Tank Inerting		Χ	
NAV/COM	Secure Voice		Х	
STORES MGT	AIM-9	*		
	Arm and Release Power- Station's 1 Thru 9		Х	
AVIONICS	40/42 ASHM		Х	
	MFD's	Х		
	Left Inlet Station	**		
	PFLD	*		
	Radar Altimeter		Χ	
OTHER	Air Data Probe Heater (fuselage)	*		
	Battery Charger	Х		
NOTE : Equipm	I nent on this sheet may oper	I I I I I I I I I I I I I I I I I I I	ht was caused	

by bus-contactor failure at nonessential bus No. 1.

^{*}Nacelle essential ac bus.

^{**}Overcurrent protection panel No. 2.

Emergency Power Distribution

MAIN, STANDBY, AND EPU GENERATORS FAILED (All equipment from pages A-19 and A-20 plus the following:)

		В	US ASSIGN	NMENT	
SYSTEM	INOPERATIVE EQUIPMENT	EMER AC		EMER DC	
		NO. 1	NO. 2	NO. 1	NO. 2
ENGINE	Engine ANTI ICE Sw				Х
	ENGINE FAULT Caution Light				Х
	Engine Ice Detector		Х		
	Fire/Overheat Detect and Test		Х		
	HYD PRESS Indicators		Х		
	GE100 / GE129 Low Energy Ignition Power	Х			
	NOZ POS Indicator		Х		
	OIL Pressure Indicator		Х		
FLIGHT	ADI		Х		
INSTRUMENT	Altimeter (ELECT)	Х			
	AOA Indexer			Х	
	AOA Indicator	Х			
	HIS		Х		
	Turn Needle			Х	
	INSTR MODE Sel Sw			Х	
	VVI	Х			
FUEL	Automatic Forward Fuel Transfer				Х
	FUEL FLOW Indicator	Х			
	FUEL LOW Caution Lights			Х	
	FUEL Quantity Indicator		Х		
FLT CONT	Autopilot				Х
	DBU ON Warning light (branches A & B)			х	
	DBU ON Warning Light (branches C & D)				Х
	C DF FLCS FAULT Caution Light (branches A & B)			Х	
	DR FLCS FAULT Caution Light (branches C & D)				Х
	FLCS RESET Switch (branches A & B)			Х	
	FLCS RESET Switch (branches C & D)				Х
	FLCS Power Source (branches A & B)			Х	
	FLCS Power Source (branches C & D)				Х
	FLCS Warning Light (branches A & B)			Х	

A-20.1

Emergency Power Distribution

MAIN, STANDBY, AND EPU GENERATORS FAILED — CONT (All equipment from pages A-19, A-20, and A-20.1 plus the following:)

	INOPERATIVE EQUIPMENT	В	BUS ASSIGNMENT			
SYSTEM		EMER	EMER AC		EMER DC	
		NO. 1	NO. 2	NO. 1	NO. 2	
FLT CONT (cont)	FLCS Warning Light (branches C & D)				Х	
	LEF's	Х				
	Speedbrakes			Х		
	Stick Trim			Х		
NAV/COMM	IFF		Х	Х		
	ILS				Х	
	INS	Х		Х		
	TACAN		Х	Х		
	VHF			Х		
STORES	C ALT REL Button			Х		
MANAGEMENT	Chaff/Flare Dispensers				Х	
	EMER JETT Button*			Х	Х	
	Gun		Х		Х	
	MASTER ARM Switch			Х		
	MSL STEP Switch			Х		
	NUCLEAR CONSENT Switch				Х	
	STORES CONFIG Caution Light				х	
	C DF WPN REL Button				Х	
	DR WPN REL Button			Х		
AVIONICS	CADC	Х				
	CADC Caution Light			Х		
	ICP/IKP				Х	
	MFD Video Control				Х	
	MMC/CTVS		Х			
	MMC*			Х	Х	
	Upfront Controls		Х		Х	
LIGHTS	ANTICOLLISION Strobe		Х			
	AR (flood)		Х			
	AR (slipway)				Х	
	Landing		Х			
	LANDING/TAXI/External Sw				Х	
	MAL & IND LTS TEST/BRT DIM			х		
	POSITION		Х			
	PRIMARY CONSOLES	Х				
	PRIMARY INST PNL	Х				

^{*}Indicates redundancy.



Emergency Power Distribution

MAIN, STANDBY, AND EPU GENERATORS FAILED -CONT (All equipment from pages A-19, A-20, A-20.1, and A-20.2 plus the following:)

		BUS ASSIGNMENT			
SYSTEM	INOPERATIVE	EMER AC		EMER DC	
	EQUIPMENT	NO. 1	NO. 2	NO. 1	NO. 2
LG/NWS/BRAKES	LG Hydraulic Isolation				Х
	LG Sequence (doors)				Х
	LG UP-DN Command				Х
	NWS			Х	
	WHEELS DOWN Lights			Х	
OTHER	Air Data Probe Heater (nose)	Х			
	AOA Probe Heaters	Х			
	AR System			Х	
	AVTR/CTVS				Х
	CABIN PRESS Caution Light				Х
	CAMERA/GUN Trigger				Х
	Cockpit Pressure Dump Capability				Х
	Cockpit Temperature Control			Х	
	Engine Bleed Air Valves (close capability)				Х
	EQUIP HOT Caution Light				х
	INLET ICING Caution Light				Х
	C DF LIQUID OXYGEN Quantity Indicator				
	OXYGEN Quantity Indicator				
	OXY LOW Caution Light				Х
	OXY LOW Warning Light		_	_	Х
	OBOGS Caution Light				Х
	OBOGS Concentrator		Х		
	OBOGS Monitor			Х	
	Probe Heat Monitor			Х	
	PROBE HEAT Switch			Х	
	SEAT NOT ARMED Caution Light				Х

^{*}Indicates redundancy.

Emergency Power Distribution

OPERATING EQUIPMENT — MAIN, STANDBY, AND EPU GENERATORS FAILED

		BU ASSIGNI			
SYSTEM	OPERATING EQUIPMENT	ВАТТ	BATTERY		
		NO. 1	NO. 2		
ENGINE	GE100 / GE129		Х		
	Electrical Throttle Position		^		
	PRI (no supersonic stall protection)*				
	PRI/SEC Transfer Circuit*				
INSTRU-	Airspeed/Mach Indicator*				
MENTS	Altimeter (PNEU)*				
	FTIT Indicator	Х			
	RPM Indicator	Х			
	SAI		Х		
FUEL	External Fuel Transfer*				
	FUEL MASTER Switch		Х		
	FFP*				
FLIGHT CONTROLS	Functional (except LEF's, speedbrakes, autopilot, and stick trim)*				
NAV/COMM	Intercom	Х			
	Magnetic Compass*				
	UHF Radio	Х			
LIGHTS	Spotlights	Х			
	Utility Light	Х			
LG/NWS/	Alternate LG Extension*				
BRAKES	Antiskid/Channel 1 Brakes	Х			
	Antiskid/Channel 2 Brakes		Х		
	LG Uplock/Downlock	Х			
	MLG WOW (branches A & B)	Х			
	MLG WOW (branches C & D)		Х		
	NLG WOW (branches A & B)	Х			
	NLG WOW (branches C & D)		Х		
	Parking Brake		Х		
YARNING	CANOPY	Х			
LIGHTS	ENGINE	X			
	HYD/OIL PRESS	X	<u> </u>		
	LG Yarning (handle)	^	х		

^{*}Indicates items that do not require power through the battery buses.



Emergency Power Distribution

OPERATING EQUIPMENT — MAIN, STANDBY, AND EPU GENERATORS FAILED — CONT

		BUS ASSIGNMENT BATTERY	
SYSTEM	OPERATING EQUIPMENT		
			NO. 2
CAUTION	ANTI SKID		Х
LIGHTS	ELEC SYS		Х
	HOOK		Х
	MASTER CAUTION	Х	
	SEC		Х
OTHER	Canopy Activation*		
	EPU	Х	Х
	Hook		Х
	JFS	Х	
	MAIN PWR Switch		Х
	VMS	Х	

^{*} Indicates items that do not require power through the battery buses.

T.O. BMS1F-16CM-1CL-1 NOTES:

A-20.6



NOTES:

FLIGHT CONTROL FAILURES

1.	If	ELEC SYS	,	is on, GO TO TAB A.	
2.	If HYD/OIL is		is o	on, GO TO TAB D.	
		PRESS	[FIGS	FICE	

3. If $\frac{FLCS}{FAULT}$ and/or $\frac{FLCS}{DBU ON}$ is on,

depress F-ACK button and note PFL display(s).

4. If AVIONICS is on with PFL FLCS BUS FAIL, refer to FLCS page on MFD.

PFL	GO TO	PAGE			
FLCS WARNING LIGHT ILLUMINATED					
FLCS AOA WARN	AOA MALFUNCTION	B-5			
STBY GAIN	AIR DATA MALFUNCTIO	NSB-9			
FLCS LEF LOCK	LEF MALFUNCTION				
FLCS DUAL FAIL	(SYMMETRIC)AIRCRAFT NON-RESPONIN PITCH OR FLCS DUAL	√SIVE			
	ELECTRONIC FAILURE	B-15			
FLCS FAULT CAUTIO	N LIGHT ILLUMINATED				
FLCS AOA FAIL	AOA MALFUNCTION	B-5			
FLCS ADC FAIL	AIR DATA MALFUNCTIO	NSB-9			
FLCS AOS FAIL	PILOT FAULT LIST-FLCS	EP-15			
FLCS FLUP FAIL	PILOT FAULT LIST-FLCS	EP-15			
FLCS HOT TEMP	FLCS TEMPERATURE				
BRK PWR DEGR	MALFUNCTIONFLCS SINGLE ELECTRON				
DRK I WK DLGK	FAILURE	_			
FLCS CCM FAIL	FLCS SINGLE ELECTRON	IC			
	FAILURE				
FLCS A/P DEGR	AUTOPILOT MALFUNCTI				
FLCS A/P FAIL	AUTOPILOT MALFUNCTI				
ISA (any) FAIL	SERVO MALFUNCTION.	B-17			
ISA ALL FAIL	SERVO MALFUNCTION.	B-17			

RUNAWAY OR NO STICK TRIM	TRIM MALFUNCTIONB-5
CADC	
OR	CADC MALFUNCTIONB-7
CADC	
ENGINE FAULT	
FLCS DBU ON	DBU ON WARNING LIGHTB-7
INCREASED	
BUFFET OR	LEF MALFUNCTION
UNCOMMANDED	(SYMMETRIC)B-11 (ASYMMETRIC)B-13
ROLL	
OUT-OF-CONTROL	RECOVERYB-19
CONTROLLABILITY (CHECKB-21

OTHER INDICATIONS:

Single failures:

- FLCS FAULT caution light.
- FLCS AOA FAIL PFL.

Dual failures (in addition to FLCS system code and FLCS AOA FAIL PFL):

- FLCS warning light.
- FLCS AOA WARN PFL.

OTHER CONSIDERATIONS:

- 1 Autopilot cannot be engaged.
- 2 If BRK PWR DEGR PFL is also present, refer to FLCS SINGLE ELECTRONIC FAILURE, page B-15.
- 3 Do not exceed 11° AOA during approach, landing, or two-point aerodynamic braking.
- If icing is suspected, Refer to AOA PROBE ICING, page B-9.



TRIM MALFUNCTION

1. TRIM/AP DISC sw - DISC, then NORM.

If normal operation is not restored:

- 2. TRIM/AP DISC sw DISC. 1
- 3. ROLL and PITCH TRIM wheels As required.

AOA MALFUNCTION

If FLCS AOA FAIL PFL occurs: **2**

- 1. Establish 1g flight.
- 2. FLCS RESET sw RESET.

If failure indications go off:

3. Continue normal operation.

If failure indications remain on:

3. Land as soon as Practical. **3 4**

END

If FLCS AOA WARN PFL occurs:

- 1. Establish 1g flight.
- 2. FLCS RESET sw RESET.

If FLCS warning light goes off:

- 3. Land as soon as practical. **3**
- If FLCS warning light remains on:
 - 3. Land as soon as possible. **3**

OTHER CONSIDERATIONS:

- 1 C If ENGINE FAULT caution light is also on, retarding the throttle below MIL while supersonic may induce inlet buzz which produces severe cockpit vibration and probable engine stalls.
- **2** If a CADC malfunction occurs, the FLCC AOS feedback function may deactivate.
- **3** Use AOA indications with caution.
- 4 Final approach airspeed
- C PW220 134, PW229 135, GE100 / GE129 136.
- D PW220 136, PW220 137, GE100 / GE129 138.
- Add 4 kts/1000 lb of fuel/stores weights. This equates to 13° AOA (add 8 kts for 11° AOA).
- 5 Do not use abrupt control inputs or make rudder inputs during rolls.
- **6** If possible, slow to 300 kts.



CADC MALFUNCTION 1 C 2

1. FLCS RESET sw - RESET.

If CADC caution light goes off:

- 2. **PW220** AB RESET sw AB RESET, then NORM.
- 3. Check for an ENG MACH FAIL PFL.

If ENG MACH FAIL PFL is still present:

4. **PW220** / **PW229** Continue flight and observe throttle limitation, if supersonic.

Refer to PILOT FAULT LIST - ENGINE:

PW220 page EP-11.

PW229 page EP-7.

5. **GE100** / **GE129** Refer to PILOT FAULT LIST - ENGINE:

GE100 page EP-13.

GE129 page EP-9.

If ENG MACH FAIL PFL is not present:

4. Continue normal operation.

If CADC caution light remains on:

- 2. AOA Cross-check with airspeed. **3**
- 3. Land as soon as practical. 4

DBU ON WARNING LIGHT

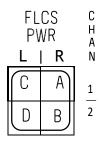
If DBU ON warning light illuminates:

- 1. Establish 1g flight. 5
- 2. Airspeed 500 kts/0.9 mach max. 6
- 3. DIGITAL BACKUP sw Cycle to BACKUP, then back to OFF.

(Cont)

OTHER CONSIDERATIONS:

- Verify that DBU is no longer present on the FLCS page of the MFD.
- 8 Do not exceed 500 kts/0.9 mach.
- If possible, slow to 300 kts. Avoid abrupt control inputs. Restrict bank angle changes to less than 90°.
- Lower LG at safe altitude and check handling qualities at 11°-13° AOA. A mild noseup transient of approx 2° occurs if LG is lowered below 200 kts.
- 11 Observe FLCS PWR lights and determine status of toe brakes. If branch A, B, or C FLCS PWR light fails to illuminate, use a maximum of 11° AOA for approach, landing, and two-point aerodynamic braking.



12 Plan a straight-in approach.

If DBU ON warning light | If DBU ON warning light goes off: **7**

- 4. FLCS RESET sw -RESET (if required).
- 5. Land as soon as practical. 8

END

remains on:

- 4. DIGITAL BACKUP sw - BACKUP.
- 5. Airspeed 500 kts/0.9 mach max. 9
- 6. Controllability -Check. 10
- 7. FLCS PWR TEST sw TEST. **11**
- 8. BRAKES channel sw Change channels (if required).
- 9. Land as soon as possible. 12

OTHER INDICATIONS:

Single Failures:

- FLCS FAULT caution light.
- FLCS ADC FAIL PFL.

Dual Failures (in addition to FLCS ADC FAIL PFL):

- FLCS warning light.
- STBY GAIN PFL.

OTHER CONSIDERATIONS:

- 1 If BRK PWR DEGR PFL is also present, refer to FLCS SINGLE ELECTRONIC FAILURE, Page B-15.
- 2 If icing is suspected, refer to AOA PROBE ICING, page B-9
- **3** Airspeed 240-650 kts with LG up.
- 4 Do not slow below 240 kts with LG up if STBY GAIN PFL is still present.
- 5 Maintain approximately 1g flight.
- **6 W** Departure from controlled flight is possible below 200 KCAS or if actual AOA exceeds 12 degrees.
- Verify proper probe heat monitor operation by observing PROBE HEAT light flashing 3-5 times per second during test.
- 8 Increased external heating and airflow due to higher airspeed may correct an iced (stuck) probe condition.
- **9** Descend below the freezing level (if possible).
- **10** With LEF's at or near full up, there are no unique control inputs required.
- A FLCS AOA FAIL PFL occurs if actual AOA differs by 6 degrees from the fixed AOA indication when in takeoff and landing gains.

AIR DATA MALFUNCTIONS

If FLCS ADC FAIL PFL occurs: 1

- 1. Establish 1g flight.
- 2. FLCS RESET sw RESET.

If failure indications go off:

3. Continue normal operation.

If failure indications remain on:

3. Land as soon as practical. **2**

If STBY GAIN PFL occurs:

- 1. Establish 1g flight with max of 12° AOA. 3
- 2. FLCS RESET sw RESET.
- 3. Land as soon as practical. 4

AOA PROBE ICING

If AOA probe icing is suspected:

- 1. Airspeed 200 kts min until LG is down. 5 6 W
- 2. PROBE HEAT sw TEST, then PROBE HEAT. 7
- 3. Airspeed Increase (if practical). 8
- 4. Icing conditions Avoid. 9

If AOA indication remains fixed:

- 5. Fly final approach using computed final approach KCAS for 11 degrees AOA. **10**
- 6. Land as soon as practical

OTHER CONSIDERATIONS:

- 1 FLCS LEF LOCK PFL may not occur.
- **2 W** Exceeding 12° AOA reduces departure resistance. Limit rolling maneuvers to a max bank angle change of 90° and avoid rapid roll rates.
- 3 Lock LEF's in landing configuration at final approach airspeed at a safe altitude. This makes final approach and landing as normal as possible and protects against uncommanded LEF excursions close to the ground.
- 4 The LEF's may drift up after being locked manually.
- With the LEF's at or near full up, there are no unique control inputs required. A small increase in airspeed may be noted compared to a normal landing approach at 11 ° AOA. With the LEF's at or near full down, the aircraft may tend to float in ground effect and a slight forward stick force may be required.
- **6 C** Placing MAIN PWR sw to OFF before hydraulic pressure is lost may cause damage to two LEF shafts.



LEF MALFUNCTION (SYMMETRIC) 1

If an FLCS LEF LOCK PFL occurs or a malfunction is suspected (without an FLCS LEF LOCK PFL):

- 1. AOA 12° max. **2 W**
- 2. FLCS RESET sw RESET.

If FLCS warning light resets:

3. Continue flight.

If FLCS warning light does not reset or a malfunction is suspected (without an FLCS LEF LOCK PFL):

- 4. Airspeed Decelerate to subsonic, if supersonic.
- 5. LE FLAPS sw LOCK (after LG is down). 3 4
- 6. Land as soon as practical. 5

During engine shutdown:

7. MAIN PWR sw - Do not place to OFF until engine rpm has reached zero. 6 C

OTHER CONSIDERATIONS:

- **1** W ◆ Exceeding 10° AOA may result in insufficient roll authority. Limit rolling maneuvers to gentle roll in with a max bank angle of 30°.
- ◆ FIWING a fast approach (lower than 6° AOA) presents additional control difficulties caused by a change in the path of the disturbed airflow coming off the failed LEF.
- **2** W Minimize rudder inputs. Use rudder as required to reduce sideslip when jettisoning stores or to aid in maintaining desired ground track during the final part of landing approach. Do not use rudder trim.
- **3** Lock operating LEF as near symmetrical as possible.
- 4 The LEF's may drift up after being locked manually.
- Consider selective jettison of stores from the heavy wing as a means to reduce roll control requirements.

 Refer to SELECTIVE JETTISON, page F-29.
- **6** C Reduce fuel weight if fatigue is not a factor. Fuel flow is significantly higher with an LEF failed full up or down and must be considered during recovery.
- Lower LG at a safe altitude and check handling qualities at 6°-8° AOA.
- **8** W ◆ Prior to landing with a significant asymmetric LEF condition, consider aircraft configuration, pilot experience level, pilot arm fatigue, airfield facilities, weather, winds, and light conditions (day/night). If conditions are not favorable, a controlled ejection is recommended.
- ◆ If crosswind component is greater than 10 kts, choose a runway, if possible, which allows landing with the heavy wing upwind. Fly a shallow, straight-in approach at approx 8° AOA (fly no lower than 6° AOA) with min roundout for touchdown. Use rudder, as required, to align aircraft with the runway immediately prior to touchdown.
- 9 C Until WOW, forward stick pressure in excess of approx 2 lbs results in full trailing edge down deflection of the horizontal tails with reduced directional control and wheel braking effectiveness.



LEF MALFUNCTION (ASYMMETRIC)

If LEF asymmetry occurs:

- 1. AOA 6°-10°. **1 W**
- 2. Lateral stick/roll trim As required. 2 W
- 3. LE FLAPS sw LOCK. **3 4**
- 4. Stores Jettison (if required). 5
- 5. Fuel weight Reduce (if feasible/required). 6 C
- 6. Handling qualities Check. 7
- 7. Land as soon as practical. 8 W
- 8. Stick Lower the nose immediately after touchdown. 9 C

If departure-end arrestment is required:

9. HOOK sw - DN.

FLCS TEMPERATURE MALFUNCTION

If an FLCS HOT TEMP PFL occurs:

1. Airspeed – 400 kts max (subsonic).

(Cont)

OTHER CONSIDERATIONS:

10 If possible, descend below 15,000 feet MSL.

11 W With the ECS shut down or the AIR SOURCE knob in OFF or RAM, the g-suit does not inflate and PBG is disabled.

- If AIR SOURCE knob is placed to OFF or RAM, OBOGS is inoperative. Activate EOS if OXY LOW warning light illuminates above 10,000 ft cockpit altitude.
- **12** External fuel cannot be transferred in OFF or RAM. Consider jettisoning tank(s) to decrease drag if range is critical and the ECS cannot be turned on for short periods of time to transfer fuel.

13 It may take up to 15 minutes for ram-air cooling to extinguish the caution light.



2. Altitude - 25,000 ft MSL max. **10**

3. AIR SOURCE knob - RAM. 11 W 12

If failure indications go off: 13

4. Land as soon as practical.

If failure indications remain on:

5. Land as soon as possible.



OTHER INDICATIONS:

Single Failures:

- FLCS FAULT caution light.
- FLCS AOA FAIL and FLCS ADC FAIL PFL's may accompany a BRK PWR DEGR PFL.

Dual Failures:

• FLCS warning light.

OTHER CONSIDERATIONS:

① Observe FLCS PWR lights and determine brake and brake channel affected. If branch A, B, or C FLCS PWR light fails to illuminate, use a max of 11° AOA for approach, landing, and two-point aerodynamic braking.

FL PV	C H A N	
<u>L</u>	. N	
C	A	1
D	В	2



FLCS SINGLE ELECTRONIC FAILURE

If BRK PWR DEGR or FLCS CCM FAIL PFL occurs:

- 1. Establish 1g flight and airspeed less than 400 kts (subsonic).
- 2. FLCS RESET sw RESET.

If failure indications go off:

3. Continue normal operation.

If failure indications remain on:

- 3. FLCS PWR TEST sw TEST. **1**
- 4. BRAKES channel sw Change channels (if required).
- 5. Land as soon as practical.

FLCS DUAL ELECTRONIC FAILURE

If aircraft is non-responsive in pitch and the FLCS warning light is on:

1. FLCS RESET sw - RESET.

If FLCS warning light remains on:

2. Land as soon as possible.

If FLCS warning light goes off:

3. Land as soon as practical.

If aircraft pitch response is normal and FLCS DUAL FAIL PFL occurs:

1. Establish 1g flight and airspeed less than 400 kts (subsonic).

(Cont)

OTHER CONSIDERATIONS:

2 The ATF NOT ENGAGED caution light may illuminate shortly after depressing the ADV MODE sw.

3 Reset may clear the FLCS warning light; however, the single failure is still present.

4 Observe FLCS PWR lights and determine brake and brake channel affected. If branch A, B, or C FLCS PWR light fails to illuminate, use a max of 11° AOA for approach, landing, and two-point aerodynamic braking.

FLCS PWR			C H A
L R			N
	C	A	1
	D	В	2

S No significant flWING qualities degradation should occur; however, with an FLCS dual failure, the FLCS has no redundancy.

◆ Two minutes after WOW, the FLCS FAULT caution light illuminates and an FLCS SNGL FAIL PFL occurs.

- 2. ADV MODE sw Depress. 2
- 3. FLCS RESET sw RESET. 3

If FLCS warning light goes off and no FLCS PFL's are present:

4. Continue normal operation, but do not use ADV MODE sw.

If FLCS warning light goes off and an FLCS PFL is still present:

- 4. FLCS PWR TEST sw TEST. 4
- 5. BRAKES channel sw Change channels (if required).
- 6. Land as soon as practical.

END

If FLCS warning light re mains on:

- 4. FLCS PWR TEST sw TEST. 4
- 5. BRAKES channel sw Change channels (if required).
- 6. Land as soon as practical. **5**



OTHER CONSIDERATIONS:

Hydraulic system failures or momentary drops in hydraulic pressure (e.g., wake turbulence encounter, air in hydraulic system) also illuminate the FLCS FAULT caution light and cause an ISA ALL FAIL PFL.

2 Below 15 degrees AOA.

SERVO MALFUNCTION

1. Airspeed – 400 kts max (subsonic).

If a hydraulic failure is confirmed:

2. Go to SINGLE (page D-15)/DUAL (page D-17) HYDRAULIC FAILURE.

If hydraulic pressures are normal:

3. FLCS RESET sw - RESET.

If failure indications go off:

If failure indications remain on:

4. Continue normal operation.

4. Land as soon as practical.

END

END

AUTOPILOT MALFUNCTIONS

If FLCS A/P FAIL PFL occurs:

- 1. Establish 1g flight. 2
- 2. FLCS RESET switch RESET.

If PFL clears:

3. Continue normal operation.

If PFL remains, autopilot cannot be engaged.

If FLCS A/P DEGR PFL occurs:

- 1. Maneuver aircraft into autopilot envelope.
- 2. FLCS RESET switch RESET.

If PFL clears:

3. Continue normal operation.

If PFL remains:

3. Disengage autopilot.

OTHER CONSIDERATIONS:

- **1** W Recovery from a deep stall condition will present a low airspeed situation in which the aircraft may require more than 6000 feet of altitude to attain level flight.
- If recovery (pitch rate stopped, AOA within -5 to +25 degrees, and airspeed 200 knots or greater) is not apparent by 6000 feet AGL, eject.
- 2 Engine may stall while out of control.
- Positive g, AOA indicator pegged at 32° (upright deep stall) or negative g, AOA indicator pegged at -5° (inverted deep stall).
- 4 Maintain firm pressure.
- 5 W The MPO sw must be held in the OVRD position until the deep stall is positively broken as evidenced by the pitch rate stopping, AOA in the normal range (-5 to +25°), and airspeed increasing above 200 kts. Early release of the MPO sw may delay recovery.
- Failure to adequately secure and tighten lapbelt may result in inability to reach and operate the MPO sw during out-of-control situations.
- **6 W** Pitch rocking with a high sustained yaw rate may prevent recovery. Delay stick inputs until yaw rotation stops or is minimized. Pitch, roll, and yaw oscillations associated with a deep stall should not be confused with the continuous yaw rotation associated with a spin.



OUT-OF-CONTROL RECOVERY 1 W 2

In the event of a departure from controlled flight, accomplish as much of the following as required to effect a recovery:

- 1. Controls Release.
- 2. Throttle IDLE.
- 3. FLCS RESET sw RESET.

If still out of control: 3

- 4. MPO sw OVRD and hold. 4 5 W
- 5. Stick Cycle in-phase. 6 W

OTHER CONSIDERATIONS:

- In the event that structural damage of unknown extent is encountered or if continued control of the aircraft is in doubt, consider accomplishing applicable steps of EJECTION (TIME PERMITTING), page F-23, prior to proceeding with CONTROLLABILITY CHECK.
- 2 ◆ If LEF damage is observed, consider locking LEF's. LEF's may drift up after being locked manually. If controllability is degraded with the LEF's up, consider returning the LE FLAPS sw to AUTO.
- ◆ Observe maximum AOA limitations for applicable flight condition. Refer to LEF MALFUNCTION (SYMMETRIC) page B-11, or LEF MALFUNCTION (ASYMMETRIC) page B-13.
- **3** w ◆ Consider flWING to the base of intended landing before lowering the landing gear and accomplishing the remainder of the CONTROLLABILITY CHECK.
- ◆ If a condition which might cause asymmetric TEF extension exists, consider alternate LG extension with the LG handle in UP to preclude TEF extension.

If the LG handle remains up:

- Final approach airspeed is 20 kts higher than normal.
- The TO/LDG CONFIG warning light may illuminate.
- Nozzle remains closed, resulting in higher than normal landing thrust.
- NWS is inoperative.
- BRAKES CHAN 2 must be selected.
- FLCS remains in cruise gains. Consider positioning AIR REFUEL sw to OPEN to obtain takeoff and landing gains.
- The LG handle warning light remains on to indicate the position of the gear handle is not in agreement with the actual gear position.

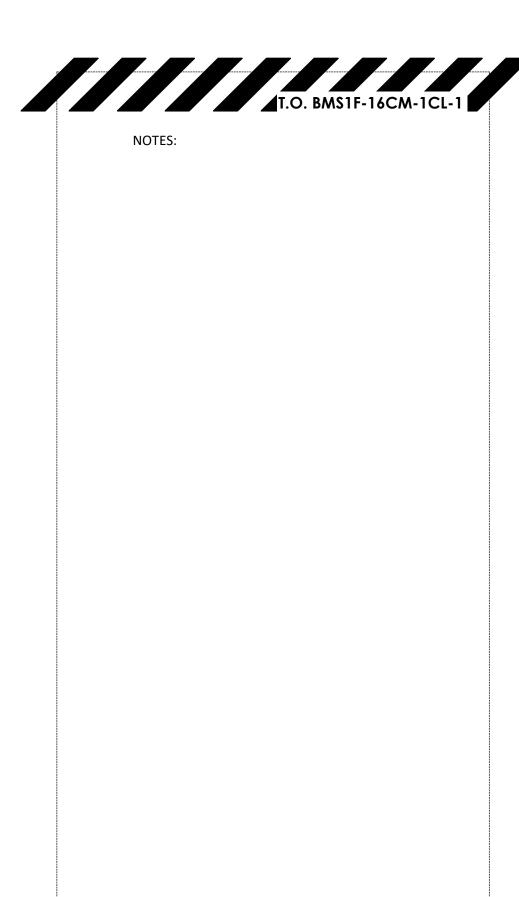
4 W If the aircraft is not controllable down to a reasonable landing speed (given consideration to weather, runway condition, facilities, pilot experience, pilot arm fatigue, etc.), an ejection is recommended.

CONTROLLABILITY CHECK

The following items should be accomplished:

- 1. Attain safe altitude. 1
- 2. GW Reduce (as required).
- 3. LE FLAPS sw As required. 2
- 4. Determine optimum configuration available for landing. **3 W**
- 5. Stores Selectively jettison (if required). Refer to SELECTIVE JETTISON, page F-27.
- 6. Slow only to that AOA/airspeed which allows acceptable handling qualities. 4 W

T.O. BMS1F-	· 16CM-1CL-1		
NOTES:			



B-23

Engine Malfunctions

Please use the menu below to navigate between the different engine types for TAB C.

PW 220

PW 229

GE 100

GE 129

TAB C



NOTES:

This section contains F100-PW-220 or F100-PW-220E engine data.

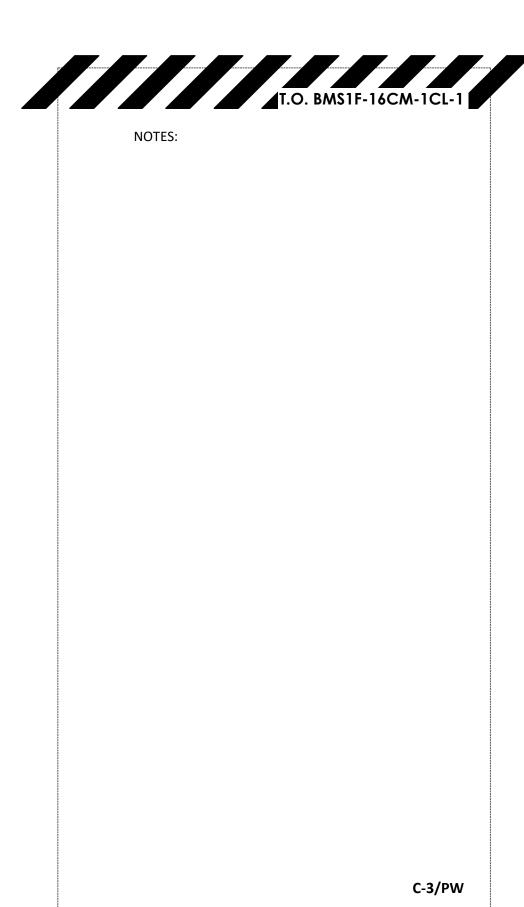
C-1/PW

Engine Malfunctions PW220

1. If ENGINE is on, check RPM and FTIT indications. If RPM and FTIT indications are normal, land as soon as practical.

Seen as practicali	
	Page
HOT START (GROUND)	C-5/PW
HUNG START/NO START	C-7/PW
•	C-7/1 W
ENGINE AUTOACCELERATION	
(GROUND)	C-7/PW
FIRE/OVERHEAT/FUEL LEAK	
(GROUND)	C-9/PW
ENGINE FAILURE ON TAKEOFF	C-11/PW
	•
AB MALFUNCTION ON TAKEOFF	C-13/PW
LOW THRUST ON TAKEOFF OR AT	
LOW ALTITUDE (NON-AB)	C-13/PW
	0 10,111
ENG FIRE	C 15/DW
ENGINE FIRE	C-15/PW
OVERHEAT CAUTION LIGHT	C-17/PW
ENGINE VIDBATIONS	0.40/044
ENGINE VIBRATIONS	C-19/PW
HYD/OIL	
PRESS OIL SYSTEM MALFUNCTION	C-19/PW
PRESS	•
ZERO RPM/ERRONEOUS RPM	
	O 01 /DW
INDICATION	C-21/PW
ENGINE STALL RECOVERY	C-21/PW
ABNORMAL ENGINE RESPONSE	C-23/PW
NOZZLE FAILURE	C-25/PW
LOW ALTITUDE ENGINE FAILURE OR	5 25 /1
	C 07/DW
FLAMEOUT	C-27/PW
STUCK THROTTLE	C-27/PW
SEC CAUTION LIGHT	C 20 /DW
SEC CAUIION LIGHT	C-29/PW
ENGINE FAULT CAUTION	
LIGHT	C-29/PW
	.,
AIRSTART PROCEDURES	C-31/PW
	•
FLAMEOUT LANDING	C-33/PW

C-2/PW





OTHER CONSIDERATIONS:

- Hot start FTIT over 680°C. During engine start, if the FTIT increases at an abnormally rapid rate through 575°C, a hot start can be anticipated.
- Motor engine with JFS until FTIT reaches 200°C.

C-4/PW



HOT START (GROUND) PW220 1

- 1. Throttle OFF.
- 2. FTIT indicator Monitor.

If FTIT remains above 500°C:

3. JFS sw – START 2. **2**

C-5/PW

OTHER CONSIDERATIONS:

- Hung start RPM has stopped increasing below IDLE and FTIT is stabilized at less than 680°C.
- No start Light-off does not occur within 20 seconds.

C-6/PW



HUNG START/NO START PW220 1

1. Throttle – OFF. Notify maintenance

ENGINE AUTOACCELERATION (GROUND) PW220

- 1. Throttle OFF.
- 2. FUEL MASTER sw OFF.

END

C-7/PW



OTHER CONSIDERATIONS:

1 An engine or JFS fire/overheat can be detected by flames, smoke, explosion, signal from ground crew, or radio call. FTIT may exceed 680°C and, if ac power is available, ENG FIRE warning or OVERHEAT caution light may illuminate.

C-8/PW



FIRE/OVERHEAT/FUEL LEAK (GROUND) PW220 1

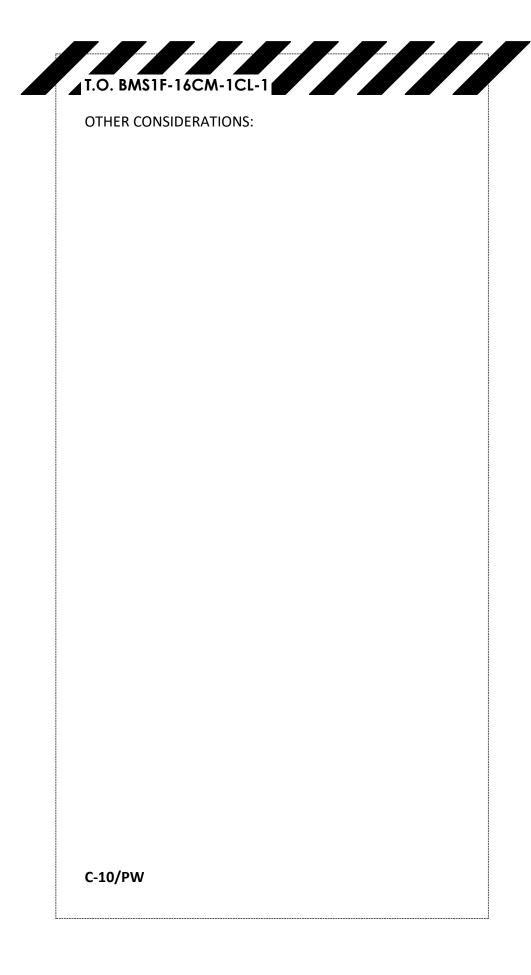
- 1. Throttle OFF.
- 2. JFS sw OFF.
- 3. FUEL MASTER sw OFF.
- 4. ENG FEED knob OFF (if external power applied).

If fire continues:

5. Abandon aircraft.

END

C-9/PW





ENGINE FAILURE ON TAKEOFF PW220

If conditions permit:

1. Abort.

If conditions do not permit an abort:

- 1. Zoom.
- 2. Stores Jettison (if possible).
- 3. Eject.

END

C-11/PW

OTHER CONSIDERATIONS:

- 1 The chances for a successful AB light with the nozzle open more than 30 percent are reduced.
- In a partial thrust situation, thrust available may increase as altitude decreases. 250 kts approximates the airspeed at which thrust required for level flight is the lowest.
- **W** With the nozzle missing or failed open, catastrophic engine failure and fire are probable with prolonged power settings above 850°C FTIT while in SEC.
- 4 SEC should only be selected when it becomes apparent that sufficient thrust cannot be achieved in PRI. SEC eliminates the additional thrust and the engine protection benefits provided by the DEEC in PRI.

C-12/PW

AB MALFUNCTION ON TAKEOFF PW220

If decision is made to stop:

1. Abort.

If takeoff is continued:

- 1. Throttle MIL.
- 2. Stores Jettison (if required).

LOW THRUST ON TAKEOFF OR AT LOW **ALTITUDE (NON-AB) PW220**

If on takeoff and the decision is made to stop:

1. Abort.

If takeoff is continued and/or thrust is insufficient:

- 1. Throttle AB. 1
- 2. Stores Jettison (if required). **2**

If PRI thrust is insufficient to maintain level flight at a safe altitude:

3. ENG CONT sw – SEC. **3 W 4**

END

OTHER CONSIDERATIONS:

- 1 Maintain takeoff thrust until min recommended ejection altitude is attained and then throttle to min practical.
- 2 ◆ If fire occurred in AB, ENG FIRE warning light may not illuminate. Fire should extinguish after throttle is retarded; however, nozzle damage may result in lower than normal thrust.
- ◆ If within gliding distance of a suitable runway, consider shutting the engine down. If the decision is made to shutdown the engine, turn the EPU on prior to engine shutdown in order to ensure proper EPU operation.
- **3** Determine if fire and overheat detection circuits are functional.
- 4 W An in-flight fire may cause the degradation or failure of multiple systems. If time and conditions permit, attempt to determine the status of individual flight controls, speedbrakes, FLCS branches, and available thrust.

C-14/PW

ENGINE FIRE PW220

If on takeoff and conditions permit:

1. Abort.

If takeoff is continued:

- 1. Climb. **1**
- 2. Stores Jettison (if required).

At a safe altitude:

3. Throttle – Min practical. **2**

If ENG FIRE warning light goes off:

4. FIRE & OHEAT DETECT button – Depress. 3

If fire persists:

If fire indications cease:

5. Eject.

5. Land as soon as possible. 4 W

END

END

C-15/PW

OTHER CONSIDERATIONS:

- **1** ◆ Determine if fire and overheat detection circuits are functional.
- **2** If the EPU was manually turned on, consider turning it off to determine if it is the source of the overheat condition. If the OVERHEAT caution light remains on, the EPU should be turned back on.
- **3** External fuel cannot be transferred in OFF or RAM. Consider jettisoning tank(s) to decrease drag if range is critical and the ECS cannot be turned on for short periods of time to transfer fuel.
- **4 W** ◆ With the ECS shut down or the AIR SOURCE knob in OFF or RAM, the g-suit does not inflate and PBG is disabled.
- **5 W** If LG handle does not lower, select BRAKES CHAN 2 and position ALT FLAPS sw to EXTEND. Nozzle remains closed, resulting in higher than normal landing thrust.

OVERHEAT CAUTION LIGHT PW220

Accomplish as many of the following as required to extinguish the caution light. If the light goes off, verify the integrity of the overheat detection circuit by depressing the FIRE & OHEAT DETECT button and land as soon as possible.

- 1. Throttle Min practical.
- 2. FIRE & OHEAT DETECT button Depress. 1

If OVERHEAT caution light extinguishes and detect circuit checks good:

3. Land as soon as possible.

If OVERHEAT caution light remains on (or detect circuit checks bad) and EPU is running:

3. EPU sw – OFF (if feasible). 2

If OVERHEAT caution light remains on (or detect circuit checks bad):

- 4. OXYGEN 100%.
- 5. AIR SOURCE knob OFF. **3 4 W**
- 6. Descend to below 25,000 ft (18,000 ft if conditions permit) and reduce airspeed to below 500 kts.

When airspeed is reduced and cockpit is depressurized:

- AIR SOURCE knob RAM (below 25,000 ft).
 4 w
- 8. Nonessential electrical equipment Off.

If OVERHEAT caution light still remains on (or detect circuit checks bad):

- 9. TANK INERTING sw TANK INERTING even if Halon is not available.
- 10. LG Handle DN (300 kts/0.65 mach max). (Use DN LOCK REL button if required.) **5 W**
- 11. Land as soon as possible.

END

C-17/PW

OTHER INDICATIONS:

- Below 15 psi at IDLE.
- Below 30 psi at MIL.
- Above 95 psi.
- Pressure fluctuations greater than ± 5 psi at IDLE or ±10 psi above IDLE.
- Lack of oil pressure rise when the rpm is increased.

OTHER CONSIDERATIONS:

If the HYD/OIL PRESS warning light is illuminated with normal OIL and HYD pressure indications, suspect oil pressure sw failure or hydraulic pressure sw failure. Monitor OIL and HYD pressure indicators and land as soon as practical.

2 Monitor hydrazine use. If consumption rate is too high, cycle EPU sw to OFF, then NORM to conserve hydrazine. Be prepared to place EPU sw back to ON if the engine seizes.

3 C Throttle movement/rpm change may cause engine seizure.

4 Plan to fly an SFO. Refer to FLAMEOUT LANDING, page C-33.

C-18/PW



ENGINE VIBRATIONS PW220

If vibrations persist:

- 1. Throttle Minimum practical.
- 2. Land as soon as possible.

OIL SYSTEM MALFUNCTION PW220

If an oil pressure malfunction is suspected:

- 1. Attain desired cruise altitude. 1
- 2. Stores Jettison (if required).
- 3. Throttle Approx 80 percent rpm.
- 4. EPU sw ON. **2**
- 5. Throttle Do not move until landing is assured. 3 C
- 6. Land as soon as possible. 4
- 7. Refer to ACTIVATED EPU/HYDRAZINE LEAK, page F-13.

C-19/PW

OTHER CONSIDERATIONS:

- **1 W** Assume engine alternator is inoperative or malfunctioning. If the engine is shut down, an airstart may not be possible.
- Non-AB stalls may be inaudible.
- 3 Stalls may be caused by anti-ice valve failing to close at high thrust setting (throttle above midrange).
- **4 W** Shutting down the engine with an engine alternator failure (indicated by zero or erroneously low rpm, illuminated SEC caution light, illuminated ENGINE warning light, and normal thrust) results in no ignition for an airstart.
- If a non-AB stall clears, maintain throttle at midrange or below unless required to sustain flight, and jettison stores (if required).
- 6 If a self-recovering AB sequencing stall occurs when transitioning from region 3 while operating with approved fuels other than JP-4, F-40, or JET B and no other abnormal engine indication is observed, the engine is safe to operate from IDLE to MAX AB.
- If an AB stall clears, the engine is safe to operate in the IDLE to MIL range, provided no other abnormal indication is observed. Attempt further AB operation only if needed to sustain flight.

C-20/PW

ZERO RPM/ERRONEOUS RPM INDICATION PW220 1W

If SEC caution light is illuminated:

1. Go to SEC CAUTION LIGHT, page C-29.

If SEC caution light is not illuminated:

Land as soon as practical.

ENGINE STALL RECOVERY PW220

If an AB stall(s) occurs:

1. Throttle – Snap to MIL.

If AB stalls do not clear or stall(s) occurs below AB 2

- 2. Throttle IDLE.
- 3. ANTI ICE sw OFF when conditions permit. **3**

If stalls continue at idle and engine rpm is less than 60 percent with no rpm response to throttle movement:

4. Throttle – OFF.
Initiate airstart.
Refer to AIRSTART
PROCEDURES,
page C-31. 4 W

If non-AB stall(s) clears:

- 5. Throttle Midrange or below. **5**
- 6. Land as soon as possible.

END

If AB stall(s) clears:

5. Throttle - As required. **6**

END

C-21/PW

OTHER INDICATIONS:

- Engine oscillations.
- Insufficient thrust at MIL (with or without correct indications).
- Lack of response to throttle commands.
- Nozzle indicating or suspected full open or closed.

OTHER CONSIDERATIONS:

- **1** W ◆ Failure to monitor sink rate and height above terrain while applying low thrust recovery procedures can result in ejection outside ejection seat performance envelope.
- ◆ Jettison stores when necessary to increase flWING time available to complete actions designed to restore thrust.
- **2** ◆ Transfer to SEC removes stall recovery logic. If SEC is selected while the engine is stalling, a stagnation may occur.
- ◆ The ENG CONT sw should not be returned to **C DF** PRI, **DR** NORM after landing in an attempt to open the nozzle and decrease thrust.
- Retarding the throttle below MIL while supersonic may induce inlet buzz which produces severe cockpit vibration and probable engine stalls.
- 4 Stalls may be caused by the anti-ice valve failing to close at high throttle settings (above midrange).
- Attempts to establish a min practical throttle setting that provides sufficient thrust may result in repeated stalls that clear when the throttle is retarded. Note stalled RPM/throttle position and attempt to establish a lower throttle setting that provides sufficient thrust.
- Transfer to SEC while supersonic should be accomplished with the throttle at MIL. Subsonic transfers to SEC below 40,000 ft MSL should be accomplished with the throttle at midrange or above.
- **7 C** Below 15,000 ft MSL, maintain 70 percent rpm min until landing is assured.

ABNORMAL ENGINE RESPONSE PW 220

1 W 2

If in AB or supersonic:

1. Throttle – MIL 3 C

If thrust is low and nozzle is suspected to be failed open, damaged, or missing:

2. Refer to NOZZLE FAILURE **PW220**, page C-25.

If problem still exists:

- 3. AB RESET sw AB RESET, then NORM.
- 4. Airspeed 250 kts (if thrust is too low to sustain level flight).

If problem still exists:

- 5. Throttle IDLE.
- 6. ANTI ICE sw OFF. 4
- 7. Throttle Slowly advance to min practical. **5**

If current thrust will allow a safe landing:

8. Land as soon as possible.

If suitable thrust cannot be attained or thrust is too high to permit a safe landing:

- 8. Throttle Midrange.
- 9. ENG CONT sw SEC. 6 7 C
- 10. Throttle Min practical.

(Cont)

OTHER CONSIDERATIONS:

8 During landing in SEC, idle thrust is approx twice that in PRI with a normal nozzle. Minimize taxi distance after landing to prevent overheating of the brakes due to increased thrust.

9 C An SFO is not recommended if engine is operating satisfactorily in SEC.

10 W Delaying engine shutdown can result in a long, fast landing. Wheel braking is less effective due to lack of WOW and there is an increased probability of a missed cable engagement.

11 If engine does not respond, shut down the engine with the FUEL MASTER sw. At MIL, the engine flames out in approx 6 sec. At IDLE, the engine flames out in approx 45 sec.

12 W The hook may miss the cable if the aircraft is not slow enough to compress the MLG struts sufficiently to make WOW or if forward stick pressure is held.

If current SEC thrust will allow a safe landing.

11. Land as soon as practical. 8 9 C

When landing is assured:

12. Throttle – Verify engine responds normally to throttle movement from IDLE to MIL; set as required.

If suitable thrust cannot be attained:

- 11. ENG CONT sw C **DF** PRI, **DR** NORM.
- 12. Throttle AB (if required to sustain level flight).
- 13. Land as soon as possible.

If thrust is too high to permit a safe landing:

11. Plan a flameout landing. Refer to FLAMEOUT LANDING, page C-33.

When prepared to land (normally high key): 10 W

- 12. Throttle OFF. 11
- 13. HOOK sw DN (if required). 12 W

END

OTHER CONSIDERATIONS:

I SEC should only be selected when it becomes apparent that sufficient thrust cannot be achieved in PRI. SEC eliminates the additional thrust and the engine protection benefits provided by the DEEC in PRI. The nozzle loss logic holds the engine in PRI for these reasons.

With the nozzle missing or failed open, catastrophic engine failure and fire are probable with prolonged high power settings above 850°C FTIT while operating in SEC.

3 C If airspeed drops below 250 kts, trade altitude to reacquire 250 kts. Do not descend below min recommended ejection altitude or min safe altitude, whichever is appropriate.



NOZZLE FAILURE PW 220

If thrust is low and a failed open, damaged, or missing nozzle is suspected:

- 1. Throttle MIL or below.
- 2. Stores Jettison (if required).
- 3. Airspeed 250 knots.

If thrust is sufficient to reach a suitable landing field:

4. Land as soon as possible. Plan a flameout landing. Refer to FLAMEOUT LANDING, page C-33.

If unable to reach a suitable landing field and level flight cannot be maintained by 1000 ft above min recommended ejection altitude or min safe altitude, whichever is appropriate:

- 5. ENG CONT sw SEC. 1
- 6. Throttle As required to maintain 250 kts in level flight above minimum recommended ejection altitude or minimum safe altitude, whichever is appropriate. 2 W 3 C
- 7. Land as soon as possible. Plan a flameout landing. Refer to FLAMEOUT LANDING, page C-33.

END

- 1 If stores jettison is attempted after main and standby generators drop off line but before EPU generator powers the SMS (approx 5 sec delay), stores will not jettison.
- **2** Visually confirm the stores have jettisoned and jettison again if required.
- **3 W** Below 4000 ft AGL, there may be insufficient time to perform an airstart prior to min recommended ejection altitude.
- 4 Consider Delaying selection of SEC with the throttle stuck in AB until sufficient altitude is gained to perform a flameout landing in case an engine stall and flameout occur on transfer to SEC.
- **5 W** ◆ If the throttle is stuck and thrust is suitable for sustained flight, attempts to free the throttle should be delayed until within gliding distance of a suitable landing field.
- ◆ Extended AB use may result in unrecoverable trapped external fuel. Monitor internal fuel quantities to preclude unexpected engine flameout due to fuel starvation.
- **6 W** Delaying engine shutdown can result in a long, fast landing. Wheel braking is less effective due to lack of WOW and there is an increased probability of a missed cable engagement.
- At MIL, the engine flames out in approx 6 sec; at IDLE, the engine flames out in approx 45 sec. The engine will likely experience a stall and brief over temperature after the FUEL MASTER sw is placed to OFF.
- 8 W The hook may miss the cable if the aircraft is not slow enough to compress the MLG struts sufficiently to make WOW or if forward stick pressure is held.

C-26/PW



LOW ALTITUDE ENGINE FAILURE OR FLAMEOUT PW220

If low altitude engine failure or flameout occurs:

- 1. Zoom.
- 2. Stores Jettison (if required). 1 2
- 3. Perform airstart (if altitude permits), Refer to AIRSTART PROCEDURES, page C-31. **3** W

STUCK THROTTLE

If throttle is stuck in AB:

1. ENG CONT sw – SEC. 4

After engine is operating in SEC or if throttle is stuck below AB: **5** W

- 2. Stores Jettison (if required).
- 3. Throttle Depress cutoff release, rotate throttle grip outboard and apply necessary force.

If throttle is still stuck:

4. Perform positive and negative g and sideslip maneuvers and attempt to move throttle.

If throttle is still stuck and thrust is too high to permit a safe landing:

 Plan a flameout landing. Refer to FLAMEOUT LANDING, page C-33, prior to placing FUEL MASTER sw off.

When prepared to land:

- 6. EPU sw ON.
- 7. JFS sw START 2.

When at high key or within gliding distance of a suitable landing field: **6 W**

- 8. FUEL MASTER sw OFF. **7**
- 9. HOOK sw DN (if required). 8 W

END

C-27/PW

OTHER CONSIDERATIONS:

- 1 The ENG CONT sw should not be returned to C DF PRI, DR NORM after landing in an attempt to open the nozzle and decrease thrust.
- **2 C** Retarding the throttle below MIL while supersonic may induce inlet buzz which produces severe cockpit vibration and probable engine stalls.
- 3 AB operation is inhibited. Above 40,000 ft MSL, minimize throttle movement. Below 15,000 ft MSL, if rpm is below 70 percent, slowly advance throttle to achieve a min of 70 percent rpm.
- **4 W** ◆ If the rpm indication is also zero or erroneously low, the engine alternator may have failed. If the engine is shut down, an airstart may not be possible.
- **5** During landing in SEC, idle thrust is approx twice that in PRI with a normal nozzle.
- If ENG BUS FAIL PFL is displayed or has been displayed, MUX communication with the EDU is no longer possible. Subsequently, if an engine PFL occurs, the ENGINE FAULT caution light illuminates but cannot be reset and that PFL cannot be displayed on the PFLD.
- 7 This action resets the DEEC and may clear the failure condition.
- The failure condition no longer exists if the PFL is not present during the fault recall.

SEC CAUTION LIGHT PW220 1

If SEC caution light illuminates while supersonic:

1. Throttle – Do not retard below MIL until subsonic. **2 C**

When subsonic or if SEC caution light illuminates while subsonic:

- 2. Throttle Verify engine responds normally to throttle movement from IDLE to MIL; set as required. 3 4 W
- 3. ENG CONT sw SEC.
- 4. Land as soon as practical. 5

If engine is operating abnormally in SEC:

5. Refer to ABNORMAL OR NO ENGINE RESPONSE, **PW220** page C-23.

ENGINE FAULT CAUTION LIGHT PW220

If ENGINE FAULT caution light illuminates:

- 1. PFLD Note PFL(s) displayed. 6
- C DF F-ACK, DR FAULT ACK button Depress to acknowledge fault.

If ENGINE FAULT caution light does not reset when the fault is acknowledged:

- 3. Throttle 85 percent RPM or less.
- 4. Land as soon as possible.

If ENGINE FAULT caution light resets when the fault is acknowledged:

- 3. Refer to PILOT FAULT LIST ENGINE, page EP-7.
- 4. AB RESET sw AB RESET, then NORM. 7
- 5. **C DF** F-ACK, **DR** FAULT ACK button Depress to perform fault recall. **8**

C-29/PW

OTHER CONSIDERATIONS:

- **1 C** FTIT should decrease rapidly when throttle is OFF. If FTIT does not decrease rapidly, verify that the throttle is OFF.
- Maintain 250 kts min for PRI or 275 kts min for SEC below 40,000 ft for a spooldown airstart.
- **3 C** If it appears rpm will go below 25 percent, advance throttle to IDLE regardless of FTIT or airspeed.
- Maintain max range or max endurance airspeed (200 or 170 kts respectively, plus 5 kts per 1000 lb of fuel/store weights over C 1000, D zero lb) with the JFS RUN light on (200 knots min for SEC airstarts).
- **5 C** Do not fly slower than 200 kts for SEC JFS-assisted airstarts.



AIRSTART PROCEDURES PW 220

To accomplish an airstart:

- Throttle OFF. 1 C
 Airspeed As required. 2

When rpm is 5025 percent with FTIT below 700°C:

- 3. Throttle IDLE. **3** C
- 4. JFS sw START 2 below 20,000 ft MSL and below 400 kts. **4 5 C**

(Cont)

OTHER CONSIDERATIONS:

- 6 If stores jettison is attempted after main generator drops off line but before EPU generator powers the SMS (approx 5 sec delay), stores will not jettison.
- **7** Visually confirm the stores have jettisoned and jettison again if required.
- 8 Place the ENG CONT sw to SEC prior to placing the throttle to IDLE, otherwise a start anomaly may result.
- The proximity of the ENG CONT sw to the JFS sw makes the JFS sw susceptible to being bumped to OFF when selecting SEC.
- **9 C** Do not turn JFS or EPU off if indicated rpm is below 60 percent with adequate thrust (e.g., tower shaft failure).
- 10 Verify MAIN GEN and STBY GEN lights are off.
- 11 If warning flag(s) is in view, refer to TOTAL INS FAILURE, page F-29.
- **12 W** If only AUX flag is in view, pitch and roll attitude information is likely to be erroneous due to INS autorestart in the attitude mode when other than straight and level, unaccelerated flight conditions existed.
- 13 If the SEC caution light is on, refer to SEC CAUTION LIGHT **PW220**, page C-29.

5. Stores - Jettison (if required). 6 7

If hung/hot/no start and airstart conditions were not met:

- 6. Throttle OFF.
- 7. Reattempt airstart in mode selected by the DEEC.

If hung/hot/no start and airstart conditions were met:

- 8. Throttle OFF.
- 9. ENG CONT sw SEC. 8
- 10. Throttle IDLE.

If still hung/hot/no start and airstart conditions were met:

- 11. Throttle OFF.
- 12. ENG CONT sw PRI
- 13. Throttle IDLE.

If engine does not respond normally after airstart is completed:

14. Refer to FLAME-OUT LANDING, page C-33.

END

If engine responds normally: **9 C**

- 14. JFS sw OFF.
- 15. ELEC CAUTION RESET button -Depress. 10
- 16. EPU sw OFF, then NORM.
- 17. ADI-Check for presence of OFF and/or AUX warning flags. 11 12W
- 18. Throttle As required. 13
- 19. Land as soon as possible.
- 20. Refer to ACTIVATED EPU/HYDRAZINE LEAK, page F-13.

END

C-32.1/PW

OTHER CONSIDERATIONS:

- 1 Altitudes (overhead approach):
- High key 7000-10,000 ft AGL.
 Recommended altitude is 7000 ft AGL plus 500 ft per 1000 lb of fuel/store weights over C 1000, D zero lb.
- Low key 3000-5000 ft AGL.
 Recommended altitude is 3000 ft AGL plus 250 ft per 1000 lb of fuel/store weights over C 1000, D zero lb.
- Base key 2000 ft AGL min.

Altitudes (straight-in approach):

- Clean glide 7000 ft AGL min at 8 nm.
- Lower LG 4000-8000 ft AGL at 4 nm.
 Delay lowering LG until initial aimpoint is 11°-17° below the horizon.
- **2** W Eject if a safe landing cannot be made. Ejection can be accomplished at any point in the pattern but do not delay ejection below 2000 ft AGL in an attempt to salvage a questionable approach.
- Increase airspeed by 5 kts per 1000 lb of fuel/store weights over 1000, D zero lb. This airspeed equates to approx 7°AOA.
- During an airstart attempt, do not slow below the min airstart airspeed.
- **5 W** ◆ Min EPU fuel quantity without (with) JFS running:
- Overhead approach at high key 25 (20) percent.
- Straight-in approach:
- o 8 nm 45 (40) percent.
- o 4 nm 25 (20) percent.
- ◆ The JFS alone does not provide adequate hydraulic pressure to land the aircraft.
- ◆ Do not start the JFS if engine seizure has occurred or is anticipated or if engine failure is a result of fuel starvation. Starting the JFS may result in no brake/JFS accumulator pressure for the brakes.
- ♠ If engine is not operating, consider placing the FUEL MASTER
 sw to OFF if a fuel leak exists. This action may conserve fuel for the
 JFS.
- ◆ If the JFS is erroneously placed to START 1, leave it there.
- ◆ If the JFS RUN light does not illuminate or goes off once illuminated, place the JFS sw to OFF and reattempt START 2 when the brake/JFS accumulators are recharged. The JFS sw does not relatch in either start position while the JFS is spooling down.

C-32.2/PW



FLAMEOUT LANDING PW 220 1 2 W

- 1. Stores Jettison (if required).
- 2. Airspeed 200. **3 4**
- 3. EPU sw ON.
- 4. JFS sw START 2 below 20,000 feet MSL and below 400 knots. 5 W 6
- 5. AIR SOURCE knob RAM (below 25,000 ft MSL).
- 6. DEFOK lever Forward.

(Cont)

C

FUEL/ STORE	ALTITUDE – FEET AGL		KIAS		
WT	н	LOW	LG-UP	LG-DN	MIN
1000	7000	3000	200	190	180
2000	7500	3250	205	195	185
3000	8000	3500	210	200	190
4000	8500	3750	215	205	195
5000	9000	4000	220	210	200
6000	9500	4250	225	215	205
7000	10,000	4500	230	220	210
8000	10,500	4750	235	225	215

D

FUEL/ STORE	ALTITUDE – FEET AGL		KIAS		
WT	HI	LOW	LG-UP	LG-DN	MIN
0000	7000	3000	200	190	180
1000	7500	3250	205	195	185
2000	8000	3500	210	200	190
3000	8500	3750	215	205	195
4000	9000	4000	220	210	200
5000	9500	4250	225	215	205
6000	10,000	4500	230	220	210
7000	10,500	4750	235	225	215
8000	11,000	5000	240	230	220

C-33/PW

OTHER CONSIDERATIONS:

- 7 W ◆ Do not delay lowering LG below 2000 ft AGL.
- ◆ If LG handle does not lower, select BRAKES CHAN 2 and position ALT FLAPS sw to EXTEND. Nozzle remains closed, resulting in higher than normal landing thrust.
- Alternate LG extension can be used up to 300 kts; however, the NLG may not fully extend until 190 kts. Time above 190 kts should be minimized in case there is a leak in the pneumatic lines.
- **9 C** ◆ NWS is not available following alternate LG extension.
- ◆ Do not depress the ALT GEAR reset button while pulling the ALT GEAR handle. This action may preclude successful LG extension.
- 10 Increase airspeed by 5 kts per 1000 lb of fuel/store weights over **C** 1000, **D** zero lb.
- 11 W Do not allow airspeed to decrease below 180 plus 5 kts per 1000 lb of fuel/store weights over C 1000, D zero lb.
- **12** C ◆ Brakes should be applied in a single, moderate, and steady application without cycling the antiskid.
- ◆ Touchdown skid control prevents brake application prior to wheel spin-up; however, brake pedal deflection of 1/16 inch causes a small flow of hydraulic fluid from the brake/JFS accumulators. To avoid depleting brake/JFS accumulator pressure, do not rest feet on the brake pedals.
- ◆ Do not attempt to taxi clear of the runway. Loss of brake/JFS accumulator pressure results in the inability to stop or steer the aircraft.

C-34/PW



- 7. LG Handle DN. (Use DN LOCK REL button if required.) **7 W**
- 8. ALT GEAR handle Pull (if required) (190 kts max, if practical). **8 9 C**
- 9. Airspeed 190kts optimum in pattern. 10

After touchdown:

10. HOOK sw - DN (if required).

If brake/JFS accumulator braking is used:

- 11. Stop straight ahead and engage parking brake. 12 C
- 12. Refer to ACTIVATED EPU/HYDRAZINE LEAK, page F-13.

END

T.O. BMS1F-16CM-1CL-1 NOTES: C-34.2/PW



This section contains F100-PW-229 engine data.

C-1/PW29

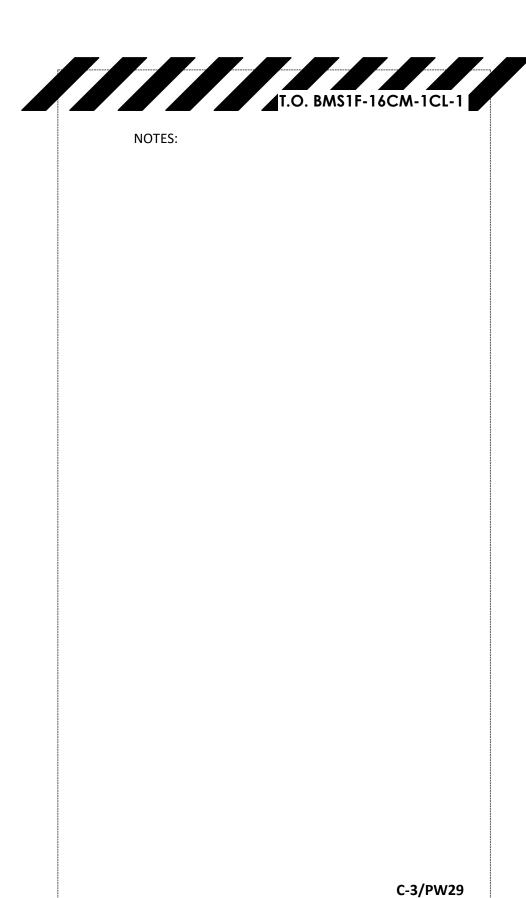
Engine Malfunctions PW229

ENG FIRE

1. If ENGINE is on, check RPM and FTIT indications. If RPM and FTIT indications are normal, land as soon as practical.

soon as practical.	
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HOT START (GROUND)	C-5/PW29
HUNG START/NO START	C-7/PW29
ENGINE AUTOACCELERATION	
(GROUND)	C-7/PW29
FIRE/OVERHEAT/FUEL LEAK	· · / · · · · · ·
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STUCK THROTTLE	C-27/PW29
	•
SEC CAUTION LIGHT	C-29/PW29
ENGINE FAULT CAUTION	/
LIGHT	C-29/PW29
AIRSTART PROCEDURES	C-31/PW29
FLAMEOUT LANDING	C-33/PW29

C-2/PW29



OTHER CONSIDERATIONS:

- Hot start FTIT over 800°C. During engine start, if the FTIT increases at an abnormally rapid rate through 750°C, a hot start can be anticipated.
- Motor engine with JFS until FTIT reaches 200°C.

C-4/PW29



HOT START (GROUND) PW229 1

- 1. Throttle OFF.
- 2. FTIT indicator Monitor.

If FTIT remains above 500°C:

3. JFS sw – START 2. **2**

C-5/PW29

OTHER CONSIDERATIONS:

- Hung start RPM has stopped increasing below IDLE and FTIT is stabilized at less than 800°C.
- No start Light-off does not occur within 20 seconds.

C-6/PW29



HUNG START/NO START PW229 1

1. Throttle – OFF. Notify maintenance

ENGINE AUTOACCELERATION (GROUND) PW229

- 1. Throttle OFF.
- 2. FUEL MASTER sw OFF.

END

C-7/PW29



OTHER CONSIDERATIONS:

1 An engine or JFS fire/overheat can be detected by flames, smoke, explosion, signal from ground crew, or radio call. FTIT may exceed 800°C and, if ac power is available, ENG FIRE warning or OVERHEAT caution light may illuminate.

C-8/PW29



FIRE/OVERHEAT/FUEL LEAK (GROUND) PW229 1

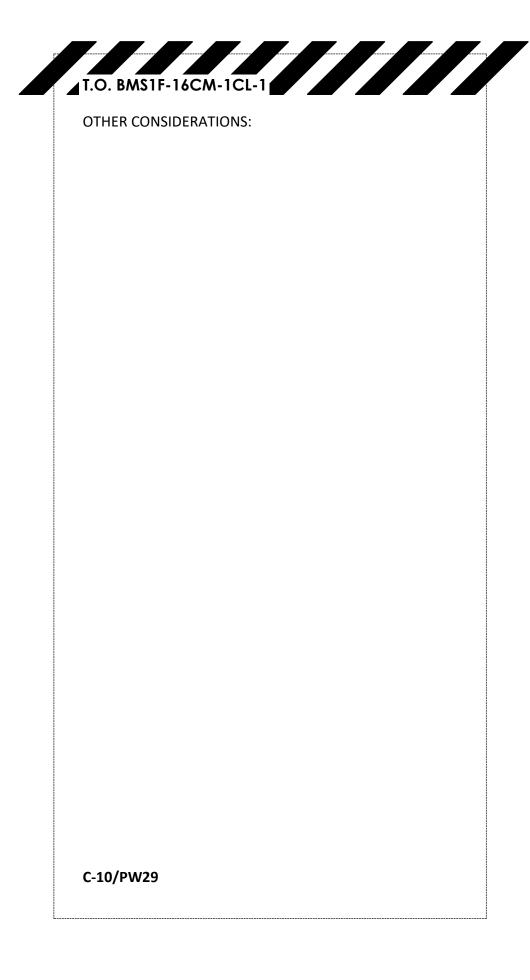
- 1. Throttle OFF.
- 2. JFS sw OFF.
- 3. FUEL MASTER sw OFF.
- 4. ENG FEED knob OFF (if external power applied).

If fire continues:

5. Abandon aircraft.

END

C-9/PW29





ENGINE FAILURE ON TAKEOFF PW229

If conditions permit:

1. Abort.

If conditions do not permit an abort:

- 1. Zoom.
- 2. Stores Jettison (if possible).
- 3. Eject.

END

C-11/PW29

OTHER CONSIDERATIONS:

- 1 The chances for a successful AB light with the nozzle open more than 30 percent are reduced.
- In a partial thrust situation, thrust available may increase as altitude decreases. 250 kts approximates the airspeed at which thrust required for level flight is the lowest.
- **3 W** With the nozzle missing or failed open, catastrophic engine failure and fire are probable with prolonged power settings above 850°C FTIT while in SEC.
- 4 SEC should only be selected when it becomes apparent that sufficient thrust cannot be achieved in PRI. SEC eliminates the additional thrust and the engine protection benefits provided by the DEEC in PRI.

C-12/PW29

AB MALFUNCTION ON TAKEOFF PW229

If decision is made to stop:

1. Abort.

If takeoff is continued:

- 1. Throttle MIL.
- 2. Stores Jettison (if required).

LOW THRUST ON TAKEOFF OR AT LOW **ALTITUDE (NON-AB) PW229**

If on takeoff and the decision is made to stop:

1. Abort.

If takeoff is continued and/or thrust is insufficient:

- 3. Throttle AB. 1
- 4. Stores Jettison (if required). 2

If PRI thrust is insufficient to maintain level flight at a safe altitude:

3. ENG CONT sw – SEC. **3 W 4**

END

OTHER CONSIDERATIONS:

- 1 Maintain takeoff thrust until min recommended ejection altitude is attained and then throttle to min practical.
- 2 ◆ If fire occurred in AB, ENG FIRE warning light may not illuminate. Fire should extinguish after throttle is retarded; however, nozzle damage may result in lower than normal thrust.
- ◆ If within gliding distance of a suitable runway, consider shutting the engine down. If the decision is made to shutdown the engine, turn the EPU on prior to engine shutdown in order to ensure proper EPU operation.
- 3 Determine if fire and overheat detection circuits are functional.
- 4 W An in-flight fire may cause the degradation or failure of multiple systems. If time and conditions permit, attempt to determine the status of individual flight controls, speedbrakes, FLCS branches, and available thrust.

C-14/PW29

ENGINE FIRE PW229

If on takeoff and conditions permit:

1. Abort.

If takeoff is continued:

- 1. Climb. **1**
- 2. Stores Jettison (if required).

At a safe altitude:

3. Throttle – Min practical. **2**

If ENG FIRE warning light goes off:

4. FIRE & OHEAT DETECT button – Depress. 3

If fire persists:

If fire indications cease:

5. Eject.

END

5. Land as soon as possible. 4 W

END

C-15/PW29

OTHER CONSIDERATIONS:

- **1** ◆ Determine if fire and overheat detection circuits are functional.
- **2** If the EPU was manually turned on, consider turning it off to determine if it is the source of the overheat condition. If the OVERHEAT caution light remains on, the EPU should be turned back on.
- **3** External fuel cannot be transferred in OFF or RAM. Consider jettisoning tank(s) to decrease drag if range is critical and the ECS cannot be turned on for short periods of time to transfer fuel.
- **4 W** ◆ With the ECS shut down or the AIR SOURCE knob in OFF or RAM, the g-suit does not inflate and PBG is disabled.
- **5 W** If LG handle does not lower, select BRAKES CHAN 2 and position ALT FLAPS sw to EXTEND. Nozzle remains closed, resulting in higher than normal landing thrust.

C-16/PW29

OVERHEAT CAUTION LIGHT PW229

Accomplish as many of the following as required to extinguish the caution light. If the light goes off, verify the integrity of the overheat detection circuit by depressing the FIRE & OHEAT DETECT button and land as soon as possible.

- 1. Throttle Min practical.
- 2. FIRE & OHEAT DETECT button Depress. 1

If OVERHEAT caution light extinguishes and detect circuit checks good:

3. Land as soon as possible.

If OVERHEAT caution light remains on (or detect circuit checks bad) and EPU is running:

3. EPU sw – OFF (if feasible). 2

If OVERHEAT caution light remains on (or detect circuit checks bad):

- 4. OXYGEN 100%.
- 5. AIR SOURCE knob OFF. **3 4 W**
- 6. Descend to below 25,000 ft (18,000 ft if conditions permit) and reduce airspeed to below 500 kts.

When airspeed is reduced and cockpit is depressurized:

- AIR SOURCE knob RAM (below 25,000 ft).
 4 w
- 8. Nonessential electrical equipment Off.

If OVERHEAT caution light still remains on (or detect circuit checks bad):

- 9. TANK INERTING sw TANK INERTING even if Halon is not available.
- 10. LG Handle DN (300 kts/0.65 mach max). (Use DN LOCK REL button if required.) **5 W**
- 11. Land as soon as possible.

END

C-17/PW29

OTHER INDICATIONS:

- Below 15 psi at IDLE.
- Below 30 psi at MIL.
- Above 95 psi.
- Pressure fluctuations greater than ± 5 psi at IDLE or ±10 psi above IDLE.
- Lack of oil pressure rise when the rpm is increased.

OTHER CONSIDERATIONS:

If the HYD/OIL PRESS warning light is illuminated with normal OIL and HYD pressure indications, suspect oil pressure sw failure or hydraulic pressure sw failure. Monitor OIL and HYD pressure indicators and land as soon as practical.

2 Monitor hydrazine use. If consumption rate is too high, cycle EPU sw to OFF, then NORM to conserve hydrazine. Be prepared to place EPU sw back to ON if the engine seizes.

3 C Throttle movement/rpm change may cause engine seizure.

Plan to fly an SFO. Refer to FLAMEOUT LANDING, page C-33.

C-18/PW29



ENGINE VIBRATIONS PW229

If vibrations persist:

- 1. Throttle Minimum practical.
- 2. Land as soon as possible.

OIL SYSTEM MALFUNCTION PW229

If an oil pressure malfunction is suspected:

- 1. Attain desired cruise altitude. 1
- 2. Stores Jettison (if required).
- 3. Throttle Approx 80 percent rpm.
- 4. EPU sw ON. **2**
- 5. Throttle Do not move until landing is assured. 3 C
- 6. Land as soon as possible. 4
- 7. Refer to ACTIVATED EPU/HYDRAZINE LEAK, page F-13.

C-19/PW29

OTHER CONSIDERATIONS:

- **1 W** Assume engine alternator is inoperative or malfunctioning. If the engine is shut down, an airstart may not be possible.
- 2 Non-AB stalls may be inaudible.
- 3 Stalls may be caused by anti-ice valve failing to close at high thrust setting (throttle above midrange).
- **4 W** Shutting down the engine with an engine alternator failure (indicated by zero or erroneously low rpm, illuminated SEC caution light, illuminated ENGINE warning light, and normal thrust) results in no ignition for an airstart.
- If a non-AB stall clears, maintain throttle at midrange or below unless required to sustain flight, and jettison stores (if required).
- 6 If an AB stall clears, the engine is safe to operate in the IDLE to MIL range, provided no other abnormal indication is observed. Attempt further AB operation only if needed to sustain flight.

C-20/PW29

ZERO RPM/ERRONEOUS RPM INDICATION PW229 1W

If SEC caution light is illuminated:

1. Go to SEC CAUTION LIGHT **PW229**, page C-29.

If SEC caution light is not illuminated:

1. Land as soon as practical.

ENGINE STALL RECOVERY PW229

If an AB stall(s) occurs:

1. Throttle – Snap to MIL.

If AB stalls do not clear or stall(s) occurs below AB 2

- 2. Throttle IDLE.
- 3. ANTI ICE sw OFF when conditions permit. **3**

If stalls continue at idle and engine rpm is less than 60 percent with no rpm response to throttle movement:

4. Throttle – OFF.
Initiate airstart.
Refer to AIRSTART
PROCEDURES,
page C-31. 4 W

If non-AB stall(s) clears:

- 5. Throttle Midrange or below. **5**
- 6. Land as soon as possible.

END

If AB stall(s) clears:

2. Throttle - As required. **6**

END

C-21/PW29

OTHER INDICATIONS:

- Engine oscillations.
- Insufficient thrust at MIL (with or without correct indications).
- Lack of response to throttle commands.
- Nozzle indicating or suspected full open or closed.

OTHER CONSIDERATIONS:

- **1** W ◆ Failure to monitor sink rate and height above terrain while applying low thrust recovery procedures can result in ejection outside ejection seat performance envelope.
- ◆ Jettison stores when necessary to increase flWING time available to complete actions designed to restore thrust.
- **2** ◆ Transfer to SEC removes stall recovery logic. If SEC is selected while the engine is stalling, a stagnation may occur.
- ◆ The ENG CONT sw should not be returned to C DF PRI, DR NORM after landing in an attempt to open the nozzle and decrease thrust.
- **3 C** Retarding the throttle below MIL while supersonic may induce inlet buzz which produces severe cockpit vibration and probable engine stalls.
- 4 Stalls may be caused by the anti-ice valve failing to close at high throttle settings (above midrange).
- Attempts to establish a min practical throttle setting that provides sufficient thrust may result in repeated stalls that clear when the throttle is retarded. Note stalled RPM/throttle position and attempt to establish a lower throttle setting that provides sufficient thrust.
- Transfer to SEC while supersonic should be accomplished with the throttle at MIL. Subsonic transfers to SEC below 40,000 ft MSL should be accomplished with the throttle at midrange or above.
- **7** C Below 15,000 ft MSL, maintain 70 percent rpm min until landing is assured.

ABNORMAL ENGINE RESPONSE PW 229

1 W 2

If in AB or supersonic:

1. Throttle – MIL 3 C

If thrust is low and nozzle is suspected to be failed open, damaged, or missing:

2. Refer to NOZZLE FAILURE **PW229**, page C-25.

If problem still exists:

- 3. \mathbf{C} \mathbf{DF} AB RESET sw AB RESET, then NORM.
- 4. Airspeed 250 kts (if thrust is too low to sustain level flight).

If problem still exists:

- 5. Throttle IDLE.
- 6. ANTI ICE sw OFF. 4
- 7. Throttle Slowly advance to min practical. **5**

If current thrust will allow a safe landing:

8. Land as soon as possible.

If suitable thrust cannot be attained or thrust is too high to permit a safe landing:

- 8. Throttle Midrange.
- 9. ENG CONT sw SEC. 6
- 10. Throttle Min practical.

(Cont)

OTHER CONSIDERATIONS:

During landing in SEC, idle thrust is approx twice that in PRI with a normal nozzle. Minimize taxi distance after landing to prevent overheating of the brakes due to increased thrust.

8 C An SFO is not recommended if engine is operating satisfactorily in SEC.

9 W Delaying engine shutdown can result in a long, fast landing. Wheel braking is less effective due to lack of WOW and there is an increased probability of a missed cable engagement.

10 If engine does not respond, shut down the engine with the FUEL MASTER sw. At MIL, the engine flames out in approx 6 sec. At IDLE, the engine flames out in approx 45 sec.

11 W The hook may miss the cable if the aircraft is not slow enough to compress the MLG struts sufficiently to make WOW or if forward stick pressure is held.

If current SEC thrust will allow a safe landing.

11. Land as soon as practical. 7 8 C

When landing is assured:

12. Throttle – Verify engine responds normally to throttle movement from IDLE to MIL; set as required.

If suitable thrust cannot be attained:

- 11. ENG CONT sw C **DF** PRI, **DR** NORM.
- 12. Throttle AB (if required to sustain level flight).
- 13. Land as soon as possible.

If thrust is too high to permit a safe landing:

11. Plan a flameout landing. Refer to FLAMEOUT LANDING, page C-33.

When prepared to land (normally high key): 9 W

- 12. Throttle OFF. **10**
- 13. HOOK sw DN (if required). **11** W

END

C-24.1/PW29

OTHER CONSIDERATIONS:

I SEC should only be selected when it becomes apparent that sufficient thrust cannot be achieved in PRI. SEC eliminates the additional thrust and the engine protection benefits provided by the DEEC in PRI. The nozzle loss logic holds the engine in PRI for these reasons.

With the nozzle missing or failed open, catastrophic engine failure and fire are probable with prolonged high power settings above 850°C FTIT while operating in SEC.

3 C If airspeed drops below 250 kts, trade altitude to reacquire 250 kts. Do not descend below min recommended ejection altitude or min safe altitude, whichever is appropriate.

C-24.2/PW29

NOZZLE FAILURE PW 229

If thrust is low and a failed open, damaged, or missing nozzle is suspected:

- 1. Throttle MIL or below.
- 2. Stores Jettison (if required).
- 3. Airspeed 250 knots.

If thrust is sufficient to reach a suitable landing field:

4. Land as soon as possible. Plan a flameout landing. Refer to FLAMEOUT LANDING, page C-33.

If unable to reach a suitable landing field and level flight cannot be maintained by 1000 ft above min recommended ejection altitude or min safe altitude, whichever is appropriate:

- 5. ENG CONT sw SEC. 1
- 6. Throttle As required to maintain 250 kts in level flight above minimum recommended ejection altitude or minimum safe altitude, whichever is appropriate. 2 W 3 C
- 7. Land as soon as possible. Plan a flameout landing. Refer to FLAMEOUT LANDING, page C-33.

END

- 1 If stores jettison is attempted after main and standby generators drop off line but before EPU generator powers the SMS (approx 5 sec delay), stores will not jettison.
- **2** Visually confirm the stores have jettisoned and jettison again if required.
- **3 W** Below 4000 ft AGL, there may be insufficient time to perform an airstart prior to min recommended ejection altitude.
- 4 Consider Delaying selection of SEC with the throttle stuck in AB until sufficient altitude is gained to perform a flameout landing in case an engine stall and flameout occur on transfer to SEC.
- **5 W** ◆ If the throttle is stuck and thrust is suitable for sustained flight, attempts to free the throttle should be delayed until within gliding distance of a suitable landing field.
- ◆ Extended AB use may result in unrecoverable trapped external fuel. Monitor internal fuel quantities to preclude unexpected engine flameout due to fuel starvation.
- **6** W Delaying engine shutdown can result in a long, fast landing. Wheel braking is less effective due to lack of WOW and there is an increased probability of a missed cable engagement.
- At MIL, the engine flames out in approx 6 sec; at IDLE, the engine flames out in approx 45 sec. The engine will likely experience a stall and brief over temperature after the FUEL MASTER sw is placed to OFF.
- 8 W The hook may miss the cable if the aircraft is not slow enough to compress the MLG struts sufficiently to make WOW or if forward stick pressure is held.

C-26/PW29



LOW ALTITUDE ENGINE FAILURE OR FLAMEOUT PW229

If low altitude engine failure or flameout occurs:

- 1. Zoom.
- 2. Stores Jettison (if required). 1 2
- 3. Perform airstart (if altitude permits), Refer to AIRSTART PROCEDURES, page C-31. **3** W

STUCK THROTTLE

If throttle is stuck in AB:

1. ENG CONT sw – SEC. 4

After engine is operating in SEC or if throttle is stuck below AB: **5** W

- 2. Stores Jettison (if required).
- 3. Throttle Depress cutoff release, rotate throttle grip outboard and apply necessary force.

If throttle is still stuck:

4. Perform positive and negative g and sideslip maneuvers and attempt to move throttle.

If throttle is still stuck and thrust is too high to permit a safe landing:

 Plan a flameout landing. Refer to FLAMEOUT LANDING, page C-33, prior to placing FUEL MASTER sw off.

When prepared to land:

- 6. EPU sw ON.
- 7. JFS sw START 2.

When at high key or within gliding distance of a suitable landing field: **6 W**

- 8. FUEL MASTER sw OFF. **7**
- 9. HOOK sw DN (if required). **8 W**

END

C-27/PW29

OTHER CONSIDERATIONS:

- 1 The ENG CONT sw should not be returned to **C DF** PRI, **DR** NORM after landing in an attempt to open the nozzle and decrease thrust.
- **2 C** Retarding the throttle below MIL while supersonic may induce inlet buzz which produces severe cockpit vibration and probable engine stalls.
- AB operation is inhibited. Above 40,000 ft MSL, minimize throttle movement.
- **4 W** ◆ If the rpm indication is also zero or erroneously low, the engine alternator may have failed. If the engine is shut down, an airstart may not be possible.
- **5** During landing in SEC, idle thrust is approx twice that in PRI with a normal nozzle.
- If ENG BUS FAIL PFL is displayed or has been displayed, MUX communication with the EDU is no longer possible. Subsequently, if an engine PFL occurs, the ENGINE FAULT caution light illuminates but cannot be reset and that PFL cannot be displayed on the PFLD.
- 7 This action resets the DEEC and may clear the failure condition.
- 8 The failure condition no longer exists if the PFL is not present during the fault recall.

SEC CAUTION LIGHT PW229 1

If SEC caution light illuminates while supersonic:

1. Throttle – Do not retard below MIL until subsonic. **2 C**

When subsonic or if SEC caution light illuminates while subsonic:

- 2. Throttle Verify engine responds normally to throttle movement from IDLE to MIL; set as required. 3 4 W
- 3. ENG CONT sw SEC.
- 4. Land as soon as practical. 5

If engine is operating abnormally in SEC:

5. Refer to ABNORMAL OR NO ENGINE RESPONSE, **PW229** page C-23.

ENGINE FAULT CAUTION LIGHT PW229

If ENGINE FAULT caution light illuminates:

- 1. PFLD Note PFL(s) displayed. 6
- 2. **C DF** F-ACK, **DR** FAULT ACK button Depress to acknowledge fault.

If ENGINE FAULT caution light does not reset when the fault is acknowledged:

- 3. Throttle 85 percent RPM or less.
- 4. Land as soon as possible.

If ENGINE FAULT caution light resets when the fault is acknowledged:

- 3. Refer to PILOT FAULT LIST ENGINE, page EP-7.
- 4. AB RESET sw AB RESET, then NORM. 7
- 5. **C DF** F-ACK, **DR** FAULT ACK button Depress to perform fault recall. **8**

C-29/PW29

OTHER CONSIDERATIONS:

- 1 If the throttle is retarded to OFF to clear a stall, it should be maintained in OFF for a few seconds to allow the stall to clear.
- **2 W** With engine failure or flameout, OBOGS is inoperative. Activate EOS if OXY LOW warning light illuminates above 10,000 ft cockpit altitude.
- 3 FTIT will decrease rapidly when throttle is OFF.
- Above 30,000 ft MSL, dive at 400 kts/0.9 mach. Below 30,000 ft MSL, establish approx 250 kts. When below 20,000 ft MSL with the JFS RUN light on and PRI mode confirmed, airspeed can be reduced to achieve max range or max endurance (200 or 170 kts, respectively, plus 5 kts per 1000 lb of fuel/store weights over 0 1000, 0 zero lb).
- 5 If the JFS sw is erroneously placed to START 1, leave it there
- If the JFS RUN light does not illuminate or goes off once illuminated, place the JFS sw to OFF and reattempt START 2 when the brake/JFS accumulators are recharged. The JFS sw does not relatch in either start position while the JFS is spooling down.
- If stores jettison is attempted after main generator drops off line but before EPU generator powers the SMS (approx 5 sec delay), stores will not jettison.
- Visually confirm the stores have jettisoned and jettison again if required.
- Place the ENG CONT sw to SEC prior to placing the throttle to midrange, otherwise a start anomaly may result.
- The proximity of the ENG CONT sw to the JFS sw makes the JFS sw susceptible to being bumped to OFF when selecting SEC.
- **9 C** Do not turn JFS or EPU off if indicated rpm is below 60 percent with adequate thrust (e.g., tower shaft failure).
- 10 Verify MAIN GEN and STBY GEN lights are off.
- 11 If warning flag(s) is in view, refer to TOTAL INS FAILURE, page F-29.
- **12 W** If only AUX flag is in view, pitch and roll attitude information is likely to be erroneous due to INS autorestart in the attitude mode when other than straight and level, unaccelerated flight conditions existed.
- **13** If the SEC caution light is on, refer to SEC CAUTION LIGHT, page C-29.

C-30/PW29

AIRSTART PROCEDURES PW 229

To accomplish an airstart:

- 1. Throttle OFF, then midrange. **3**
- 2. Airspeed As required. 4
- 3. JFS sw START 2 below 20,000 ft MSL and below 400 kts. 5
- 4. Stores Jettison (if required). 6 7

If a no light, hot start, or stall occurs:

- 5. Throttle OFF.
- 6. ENG CONT sw SEC if below 30,000 ft MSL (250 kts min). 8
- 7. Throttle Midrange.

If a hung start occurs:

8. Airspeed - Increase (max of 400 kts/0.9 mach).

If a hung start continues or there is no throttle response:

- 9. Throttle OFF when below 30,000 ft MSL.
- 10. ENG CONT sw SEC (250 kts min). 8
- 11. Throttle Midrange.

If engine does not respond normally after airstart is completed:

12. Refer to FLAMEOUT LANDING, page C-33.

If engine responds normally: 9 C

- 12. JFS sw OFF.
- 13. ELEC CAUTION RESET button Depress. 10
- 14. EPU sw OFF, then NORM.
- 15. ADI Check for presence of OFF and/or AUX warning flags. 11 12 W
- 16. Throttle As required. 13
- 17. Land as soon as possible.
- 18. Refer to ACTIVATED EPU/HYDRAZINE LEAK, page F-13.

END

C-31/PW29

OTHER CONSIDERATIONS:

- 1 Altitudes (overhead approach):
- High key 7000-10,000 ft AGL.
 Recommended altitude is 7000 ft AGL plus 500 ft per 1000 lb of fuel/store weights over C 1000, D zero lb.
- Low key 3000-5000 ft AGL.
 Recommended altitude is 3000 ft AGL plus 250 ft per 1000 lb of fuel/store weights over C 1000, D zero lb.
- Base key 2000 ft AGL min.

Altitudes (straight-in approach):

- Clean glide 7000 ft AGL min at 8 nm.
- Lower LG 4000-8000 ft AGL at 4 nm.
 Delay lowering LG until initial aimpoint is 11°-17° below the horizon.
- **2** W Eject if a safe landing cannot be made. Ejection can be accomplished at any point in the pattern but do not delay ejection below 2000 ft AGL in an attempt to salvage a questionable approach.
- Increase airspeed by 5 kts per 1000 lb of fuel/store weights over 1000, D zero lb. This airspeed equates to approx 7°AOA.
- During an airstart attempt, do not slow below the min airstart airspeed.
- **5 W** ◆ Min EPU fuel quantity without (with) JFS running:
- Overhead approach at high key 25 (20) percent.
- Straight-in approach:
- o 8 nm 45 (40) percent.
- o 4 nm 25 (20) percent.
- ◆ The JFS alone does not provide adequate hydraulic pressure to land the aircraft.
- ◆ Do not start the JFS if engine seizure has occurred or is anticipated or if engine failure is a result of fuel starvation. Starting the JFS may result in no brake/JFS accumulator pressure for the brakes.
- ♠ If engine is not operating, consider placing the FUEL MASTER
 sw to OFF if a fuel leak exists. This action may conserve fuel for the
 JFS.
- ◆ If the JFS is erroneously placed to START 1, leave it there.
- ♦ If the JFS RUN light does not illuminate or goes off once illuminated, place the JFS sw to OFF and reattempt START 2 when the brake/JFS accumulators are recharged. The JFS sw does not relatch in either start position while the JFS is spooling down.

C-32/PW29

FLAMEOUT LANDING PW 229 1 2 W

- 1. Stores Jettison (if required).
- 2. Airspeed 200. **3 4**
- 3. EPU sw ON.
- 4. JFS sw START 2 below 20,000 feet MSL and below 400 knots. $\boxed{\mathbf{5}|\mathbf{W}|}$ $\boxed{\mathbf{6}}$

(Cont)

C

FUEL/ STORE	ALTITUDE – FEET AGL		KIAS		
WT	н	LOW	LG-UP	LG-DN	MIN
1000	7000	3000	200	190	180
2000	7500	3250	205	195	185
3000	8000	3500	210	200	190
4000	8500	3750	215	205	195
5000	9000	4000	220	210	200
6000	9500	4250	225	215	205
7000	10,000	4500	230	220	210
8000	10,500	4750	235	225	215



FUEL/ STORE	ALTITUDE – FEET AGL		KIAS		
WT	н	LOW	LG-UP	LG-DN	MIN
0000	7000	3000	200	190	180
1000	7500	3250	205	195	185
2000	8000	3500	210	200	190
3000	8500	3750	215	205	195
4000	9000	4000	220	210	200
5000	9500	4250	225	215	205
6000	10,000	4500	230	220	210
7000	10,500	4750	235	225	215
8000	11,000	5000	240	230	220

C-33/PW29

OTHER CONSIDERATIONS:

- 7 W ◆ Do not delay lowering LG below 2000 ft AGL.
- ◆ If LG handle does not lower, select BRAKES CHAN 2 and position ALT FLAPS sw to EXTEND. Nozzle remains closed, resulting in higher than normal landing thrust.
- Alternate LG extension can be used up to 300 kts; however, the NLG may not fully extend until 190 kts. Time above 190 kts should be minimized in case there is a leak in the pneumatic lines.
- **9 C** ◆ NWS is not available following alternate LG extension.
- ◆ Do not depress the ALT GEAR reset button while pulling the ALT GEAR handle. This action may preclude successful LG extension.
- 10 Increase airspeed by 5 kts per 1000 lb of fuel/store weights over C 1000, D zero lb.
- 11 W Do not allow airspeed to decrease below 180 plus 5 kts per 1000 lb of fuel/store weights over C 1000, D zero lb.
- **12** C ◆ Brakes should be applied in a single, moderate, and steady application without cycling the antiskid.
- ◆ Touchdown skid control prevents brake application prior to wheel spin-up; however, brake pedal deflection of 1/16 inch causes a small flow of hydraulic fluid from the brake/JFS accumulators. To avoid depleting brake/JFS accumulator pressure, do not rest feet on the brake pedals.
- ◆ Do not attempt to taxi clear of the runway. Loss of brake/JFS accumulator pressure results in the inability to stop or steer the aircraft.

C-34/PW29

- 5. AIR SOURCE knob RAM (below 25,000 ft MSL).
- 6. DEFOG lever Forward.
- 7. LG handle DN. (Use DN LOCK REL button if required.) **7 W**
- 8. ALT GEAR handle Pull (if required) (190 kts max, if practical). **8 9 C**
- 9. Airspeed 190 kts optimum in pattern. 10

After touchdown:

10. HOOK sw – DN (if required).

If brake/JFS accumulator braking is used:

- 11. Stop straight ahead and engage parking brake. 12 C
- 12. Refer to ACTIVATED EPU/HYDRAZINE LEAK, page F-13.

T.O. BMS1F-16CM-1CL-1 NOTES: C-34.2/PW



This section contains F110-GE-100 engine data.

C-1/GE

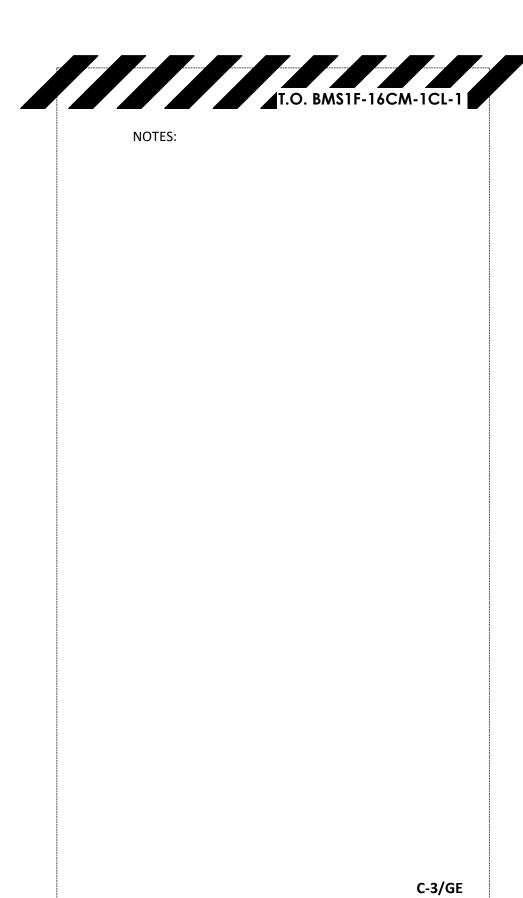
Engine Malfunctions GE100

ENG FIRE

1. If ENGINE is on, check RPM and FTIT indications. If RPM and FTIT indications are normal, land as soon as practical.

Soon as practical.	
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HUNG START/NO START	C-7/GE
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(GROUND)	C-7/GE
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ENGINE	0 10,02
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C-2/GE



OTHER CONSIDERATIONS:

- Hot start FTIT over 935°C. During engine start, if the FTIT increases through 750°C while engine rpm is less than 40 percent, a hot start can be anticipated.
- 2 Motor engine with JFS until FTIT reaches 200°C.

C-4/GE



HOT START (GROUND) GE100 1

- 1. Throttle OFF.
- 2. FTIT indicator Monitor.

If FTIT remains above 500°C:

3. JFS sw – START 2. **2**

OTHER CONSIDERATIONS:

- Hung start RPM has stopped increasing below IDLE and FTIT is stabilized at less than 935°C.
- No start Light-off does not occur within 10 seconds.

C-6/GE



HUNG START/NO START GE100 1

1. Throttle – OFF. Notify maintenance

ENGINE AUTOACCELERATION (GROUND) GE100

- 1. Throttle OFF.
- 2. FUEL MASTER sw OFF.

END

C-7/GE



OTHER CONSIDERATIONS:

1 An engine or JFS fire/overheat can be detected by flames, smoke, explosion, signal from ground crew, or radio call. FTIT may exceed 935°C and, if ac power is available, ENG FIRE warning or OVERHEAT caution light may illuminate.

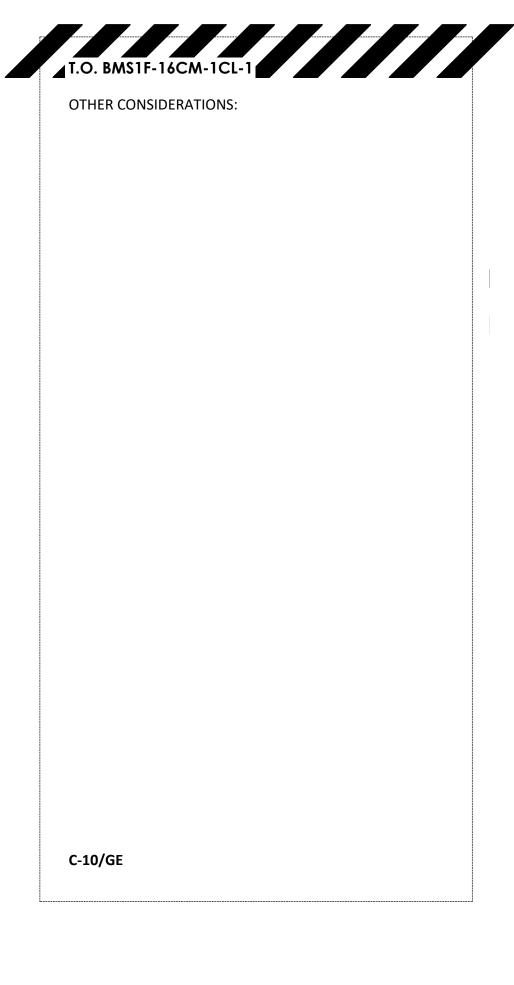
C-8/GE

FIRE/OVERHEAT/FUEL LEAK (GROUND) GE100 1

- 1. Throttle OFF.
- 2. JFS sw OFF.
- 3. FUEL MASTER sw OFF.
- 4. ENG FEED knob OFF (if external power applied).

If fire continues:

5. Abandon aircraft.





ENGINE FAILURE ON TAKEOFF GE100

If conditions permit:

1. Abort.

If conditions do not permit an abort:

- 1. Zoom.
- 2. Stores Jettison (if possible).
- 3. Eject.

END

C-11/GE

OTHER CONSIDERATIONS:

- 1 Nozzle problems may inhibit AB capability as indicated by presence of the ENG AB FAIL PFL.
- In a partial thrust situation, thrust available may increase as altitude decreases. 250 kts approximates the airspeed at which thrust required for level flight is the lowest.
- Position the ENG CONT sw to SEC for a minimum of ½ sec, then immediately back to PRI.

AB MALFUNCTION ON TAKEOFF GE100

If decision is made to stop:

1. Abort.

If takeoff is continued:

- 1. Throttle MIL.
- 2. Stores Jettison (if required).

LOW THRUST ON TAKEOFF OR AT LOW ALTITUDE (NON-AB) GE100

If on takeoff and the decision is made to stop:

1. Abort.

If takeoff is continued and/or thrust is insufficient:

- 1. Throttle AB. **1**
- 2. Stores Jettison (if required). 2

If thrust is insufficient to maintain level flight at a safe altitude:

3. ENG CONT sw – SEC (even if SEC caution light is on), then immediately back to PRI. 3 W 4

OTHER CONSIDERATIONS:

- 1 Maintain takeoff thrust until min recommended ejection altitude is attained and then throttle to min practical.
- 2 ◆ If fire occurred in AB, ENG FIRE warning light may not illuminate. Fire should extinguish after throttle is retarded; however, nozzle damage may result in lower than normal thrust.
- **3** Determine if fire and overheat detection circuits are functional.
- An in-flight fire may cause the degradation or failure of multiple systems. If time and conditions permit, attempt to determine the status of individual flight controls, speedbrakes, FLCS branches, and available thrust.

ENGINE FIRE GE100

If on takeoff and conditions permit:

1. Abort.

If takeoff is continued:

- 1. Climb. **1**
- 2. Stores Jettison (if required).

At a safe altitude:

3. Throttle – Min practical. **2**

If ENG FIRE warning light goes off:

4. FIRE & OHEAT DETECT button – Depress. 3

If fire persists:

If fire indications cease:

5. Eject.

END

5. Land as soon as possible. 4 W

END

C-15/GE

OTHER CONSIDERATIONS:

- **1** ◆ Determine if fire and overheat detection circuits are functional.
- **2** If the EPU was manually turned on, consider turning it off to determine if it is the source of the overheat condition. If the OVERHEAT caution light remains on, the EPU should be turned back on.
- **3** External fuel cannot be transferred in OFF or RAM. Consider jettisoning tank(s) to decrease drag if range is critical and the ECS cannot be turned on for short periods of time to transfer fuel.
- **4 W** ◆ With the ECS shut down or the AIR SOURCE knob in OFF or RAM, the g-suit does not inflate and PBG is disabled.
- **5 W** If LG handle does not lower, select BRAKES CHAN 2 and position ALT FLAPS sw to EXTEND. Nozzle remains closed, resulting in higher than normal landing thrust.

OVERHEAT CAUTION LIGHT GE100

Accomplish as many of the following as required to extinguish the caution light. If the light goes off, verify the integrity of the overheat detection circuit by depressing the FIRE & OHEAT DETECT button and land as soon as possible.

- 1. Throttle Min practical.
- 2. FIRE & OHEAT DETECT button Depress. 1

If OVERHEAT caution light extinguishes and detect circuit checks good:

3. Land as soon as possible.

If OVERHEAT caution light remains on (or detect circuit checks bad) and EPU is running:

3. EPU sw – OFF (if feasible). 2

If OVERHEAT caution light remains on (or detect circuit checks bad):

- 4. OXYGEN 100%.
- 5. AIR SOURCE knob OFF. **3 4 W**
- 6. Descend to below 25,000 ft and reduce airspeed to below 500 kts.

When airspeed is reduced and cockpit is depressurized:

- 7. AIR SOURCE knob RAM (below 25,000 ft). 3 4 W
- 8. Nonessential electrical equipment Off.

If OVERHEAT caution light still remains on (or detect circuit checks bad):

- 9. TANK INERTING sw TANK INERTING even if Halon is not available.
- 10. LG Handle DN (300 kts/0.65 mach max). (Use DN LOCK REL button if required.) **5 W**
- 11. Land as soon as possible.

END

C-17/GE

OTHER INDICATIONS:

- Below 15 psi at IDLE.
- Below 25 psi at MIL.
- Above 65 psi.
- Pressure fluctuations greater than ± 5 psi at IDLE or ±10 psi above IDLE.
- Lack of oil pressure rise when the rpm is increased.

OTHER CONSIDERATIONS:

- If the HYD/OIL PRESS warning light is illuminated with normal OIL and HYD pressure indications, suspect oil pressure sw failure or hydraulic pressure sw failure. Monitor OIL and HYD pressure indicators and land as soon as practical.
- 2 Monitor hydrazine use. If consumption rate is too high, cycle EPU sw to OFF, then NORM to conserve hydrazine. Be prepared to place EPU sw back to ON if the engine seizes.
- 3 C Throttle movement/rpm change may cause engine seizure.
- Plan to fly an SFO. Refer to FLAMEOUT LANDING, page C-33.
- 5 Though this is most likely a faulty indication, it is still possible that the indication reflects the actual condition; therefore, landing as soon as practical via a straight-in approach at a suitably configured airfield is recommended as a precaution.

C-18/GE

ENGINE VIBRATIONS GE100

If vibrations persist:

- 1. Throttle Minimum practical.
- 2. Land as soon as possible.

OIL SYSTEM MALFUNCTION GE100

If an oil pressure malfunction is suspected:

1. Range - Maximize. 1 2 C

If the ENG LUBE LOW PFL occurs or oil pressure is low with the HYD/OIL PRESS warning light illuminated:

- 2. Stores Jettison (if required).
- 3. EPU sw ON, if oil pressure decreases below 10 psi. 3
- 4. Land as soon as possible. 4
- 5. Refer to ACTIVATED EPU/HYDRAZINE LEAK, page F-13.

If oil pressure is out of normal operating limits without an ENG LUBE LOW PFL present or HYD/OIL PRESS warning light illuminated:

2. Land as soon as practical. **5**

OTHER CONSIDERATIONS:

- 1 Partial alternator failure may not result in transfer to SEC but may cause loss of engine fault reporting capability and zero or erroneous rpm indication.
- **2** For serious hardware problems, the engine may operate normally at idle rpm but exhibit stall/vibration conditions at thrust settings above idle rpm. Use the highest thrust setting below the stall/vibration condition to sustain flight.
- If stall(s) occurred in AB at 30,000 ft MSL or above and while subsonic, the engine is safe to operate in the IDLE to MIL range provided no other abnormal engine indications are observed.

ZERO RPM/ERRONEOUS RPM INDICATION GE100

If SEC caution light is illuminated:

1. Go to SEC CAUTION LIGHT, page C-29.

If SEC caution light is not illuminated:

1. Land as soon as practical. 1

ENGINE STALL RECOVERY GE100

If an AB stall(s) occurs:

1. Throttle – Snap to MIL.

If AB stalls do not clear or stall(s) occurs below AB:

2. Throttle – IDLE. **2**

If stalls continue, or thrust is insufficient for a safe recovery:

3. Initiate AIRSTART PROCEDURES, page C-31.

If stall(s) clear:

3. Throttle - MIL or below. Minimize throttle movements and make necessary movements slowly. 3

If stall(s) occurred at MIL or below, or in AB below 30,000 ft MSL or while supersonic:

4. Land as soon as possible.

OTHER INDICATIONS:

- Engine oscillations.
- Insufficient thrust at MIL (with or without correct indications).
- Lack of response to throttle commands.
- Nozzle indicating or suspected full open or closed.

OTHER CONSIDERATIONS:

- **1** W ◆ Failure to monitor sink rate and height above terrain while applying low thrust recovery procedures can result in ejection outside ejection seat performance envelope.
- **2 C** ◆ If SEC caution light is on, refer to SEC CAUTION LIGHT, page C-29.
- ◆ Idle PRI thrust with nozzle closed is approx 50 percent greater than idle SEC thrust.
- **3 C** Retarding the throttle below MIL while supersonic may induce inlet buzz which produces severe cockpit vibration and probable engine stalls.
- 4 Transfer to SEC may be accomplished while supersonic if the throttle remains at MIL.
- **5** AB operation is inhibited and exhaust nozzle is closed.
- 6 During landing in SEC, idle thrust is approx twice that in PRI with a normal nozzle.
- **7** W Delaying engine shutdown can result in a long, fast landing. Wheel braking is less effective due to lack of WOW and there is an increased probability of a missed cable engagement.
- If engine does not respond, shut down the engine with the FUEL MASTER sw. At MIL, the engine flames out in approx 6 seconds. At IDLE, the engine flames out in approx 45 seconds.
- **9 W** The hook may miss the cable if the aircraft is not slow enough to compress the MLG struts sufficiently to make WOW or if forward stick pressure is held.

ABNORMAL ENGINE RESPONSE GE100

If abnormal engine response occurs: 1 W 2 C

If in AB or supersonic:

1. Throttle – Retard to MIL 3 C

If subsonic or problem still exists:

- 2. ENG CONT sw SEC. 4
- 3. Airspeed 250 kts (if thrust is too low to sustain level flight).
- 4. Throttle Verify engine responds normally to throttle movement from IDLE to MIL; set as desired. 5

If a safe landing can be made with the current thrust:

5. Land as soon as practical. **6**

If thrust is insufficient to make a safe landing or abnormal engine response is still present:

- 5. ENG CONT sw C DF PRI, DR NORM.
- 6. Land as soon as possible.

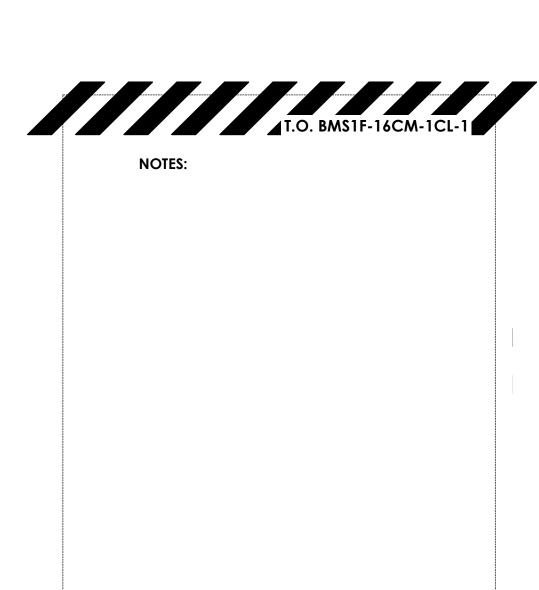
If thrust is too high to permit a safe landing:

5. Plan a flameout landing. Refer to FLAMEOUT LANDING, page C-33.

When landing is assured (normally high key): 7 W

- 6. Throttle OFF. 8
- 7. HOOK sw DN (if required). 9 W

T.O. BMS1F-16CM-1CL-1 OTHER CONSIDERATIONS: C-24/GE



C-25/GE

- 1 If stores jettison is attempted after main and standby generators drop off line but before EPU generator powers the SMS (approx 5 sec delay), stores will not jettison.
- **2** Visually confirm the stores have jettisoned and jettison again if required.
- **3 W** Below 4000 ft AGL, there may be insufficient time to perform an airstart prior to min recommended ejection altitude.
- **4 W** ◆ If the throttle is stuck and thrust is suitable for sustained flight, attempts to free the throttle should be delayed until within gliding distance of a suitable landing field.
- ◆ Extended AB use may result in unrecoverable trapped external fuel. Monitor internal fuel quantities to preclude unexpected engine flameout due to fuel starvation.
- **5 W** Delaying engine shutdown can result in a long, fast landing. Wheel braking is less effective due to lack of WOW and there is an increased probability of a missed cable engagement.
- At MIL, the engine flames out in approx 6 sec; at IDLE, the engine flames out in approx 45 sec. The engine will likely experience a stall and brief over temperature after the FUEL MASTER sw is placed to OFF.
- **7 W** The hook may miss the cable if the aircraft is not slow enough to compress the MLG struts sufficiently to make WOW or if forward stick pressure is held.



LOW ALTITUDE ENGINE FAILURE OR FLAMEOUT GE100

If low altitude engine failure or flameout occurs:

- 1. Zoom.
- 2. Stores Jettison (if required). 1 2
- 3. Perform airstart (if altitude permits), Refer to AIRSTART PROCEDURES, page C-31. **3** W

STUCK THROTTLE

If throttle is stuck in AB:

1. ENG CONT sw - SEC.

After engine is operating in SEC or if throttle is stuck below AB: 4 W

- 2. Stores Jettison (if required).
- 3. Throttle Depress cutoff release, rotate throttle grip outboard and apply necessary force.

If throttle is still stuck:

4. Perform positive and negative g and sideslip maneuvers and attempt to move throttle.

If throttle is still stuck and thrust is too high to permit a safe landing:

 Plan a flameout landing. Refer to FLAMEOUT LANDING, page C-33, prior to placing FUEL MASTER sw off.

When prepared to land:

- 6. EPU sw ON.
- 7. JFS sw START 2.

When at high key or within gliding distance of a suitable landing field: $\boxed{\mathbf{5} \ \mathbf{W}}$

- 8. FUEL MASTER sw OFF. 6
- 9. HOOK sw DN (if required). **7** W

END

C-27/GE

OTHER CONSIDERATIONS:

- **1** C Retarding the throttle below MIL while supersonic may induce inlet buzz which produces severe cockpit vibration and probable engine stalls.
- 2 AB operation is inhibited and exhaust nozzle is closed.
- 3 The sw may remain in PRI or may be placed to SEC. If the sw is placed to SEC, do not place sw back to PRI.
- **4 W** Cycling the ENG CONT sw in an attempt to regain PRI may result in reoccurrence of the original malfunction or a more severe condition.
- **5** During landing in SEC, idle thrust is approx twice that in PRI with a normal nozzle.
- **6** W Failure to monitor sink rate and height above terrain while applying low thrust recovery procedures can result in ejection outside ejection seat performance envelope.
- A broken throttle cable or throttle linkage disconnect causes a transfer to SEC and abnormal engine response in SEC. Reselecting PRI restores normal engine operation for flight; however, engine shutdown after flight requires either use of the FUEL MASTER sw or maintenance personnel action to position the MEC throttle input shaft to off.
- If throttle is stuck, control might be regained by depressing the cutoff release, rotating the throttle outboard, and applying necessary force.
- **9 W** Do not start the JFS if engine seizure has occurred or is anticipated or if engine failure is a result of fuel starvation. Starting the JFS may result in no brake/JFS accumulator pressure for the brakes.
- **10** W Delaying engine shutdown can result in a long, fast landing. Wheel braking is less effective due to lack of WOW and there is an increased probability of a missed cable engagement.
- 11 If throttle is stuck or engine does not respond, shut down the engine with the FUEL MASTER sw. At MIL, the engine flames out in approx 6 sec. At IDLE, the engine flames out in approx 45 sec.
- **12** W The hook may miss the cable if the aircraft is not slow enough to compress the MLG struts sufficiently to make WOW or if forward stick pressure is held.

C-28/GE

SEC CAUTION LIGHT GE100

If SEC caution light illuminates while supersonic:

1. Throttle – Do not retard below MIL until subsonic. 1 C

When subsonic or if SEC caution light illuminates while subsonic:

2. Throttle – Verify engine responds normally to throttle movement from IDLE to MIL; set as required. **2**

If the engine is operating normally in SEC:

- 3. ENG CONT sw -Do not cycle. 3 4 W
- 4. Land as soon practical. **5**

END

If the engine is operating abnormally in SEC: 6 W

- 3. ENG CONT sw Position to SEC, then
 back to C DF PRI,
 DR NORM.
- 4. Airspeed 250 kts (If thrust is too low to sustain level flight).
- 5. Land as soon as possible. **7**

If thrust is too high to permit a safe landing: **8**

6. Plan a flameout landing. Refer to FLAME-OUT LANDING, page C-33. 9 W

When landing is assured (normally high key): **10** W

- 7. Throttle OFF. 11
- 8. HOOK sw DN

END

ENGINE FAULT CAUTION LIGHT GE100

If ENGINE FAULT caution light illuminates:

- 1. PFLD Note PFL(s) displayed. 6
- 2. Refer to PILOT FAULT LIST ENGINE, page EP-12.
- 3. C DF F-ACK, DR FAULT ACK button Depress.

END

C-29/GE

OTHER CONSIDERATIONS:

- 1 C If at low altitude, position the ENG CONT sw to SEC for a minimum of 1/2 sec, then immediately back to PRI.
- If not at low altitude, position the ENG CONT sw to SEC. If the engine does not show signs of recovery (increasing thrust or rpm/FTIT) within 10 sec, time and conditions permitting, return the ENG CONT sw to PRI.
- Above 30,000 ft MSL, airspeeds in the 250-400 kts/0.9 mach range should be considered to reduce altitude and increase the probability of a successful airstart.
- If max gliding range is not a factor, consider maintaining 250 knots or more above 10,000 ft AGL to provide best restart conditions (in case of JFS failure). Below 10,000 ft AGL with the JFS RUN light on, maintain max range or max endurance airspeed.
- If the JFS sw is erroneously placed to START 1, leave it there.
- If the JFS RUN light does not illuminate or goes off once illuminated, place the JFS sw to OFF and reattempt START 2 when the brake/JFS accumulators are recharged. The JFS sw does not relatch in either start position while the JFS is spooling down.
- If stores jettison is attempted after main generator drops off line but before EPU generator powers the SMS (approx 5 sec delay), stores will not jettison.
- Visually confirm the stores have jettisoned and jettison again if required.
- Allow FTIT to drop below 700°C before advancing the throttle
- **9C** FTIT should decrease rapidly when throttle is OFF. If FTIT does not decrease rapidly, verify the throttle is OFF.
- Do not mistake a rapid initial FTIT increase during an airstart as an indication of a hot start.
- **10** Typically, airstarts are characterized by rapidly increasing FTIT with a slow increase in rpm.
- 11 Stay in the mode that successfully restarts the engine.
- The proximity of the ENG CONT sw to the JFS sw makes the JFS sw susceptible to being bumped to OFF when selecting SEC.
- 12 Verify MAIN GEN and STBY GEN lights are off.
- **13** If warning flag(s) is in view, refer to TOTAL INS FAILURE, page F-29.
- **14 W** If only AUX flag is in view, pitch and roll attitude information is likely to be erroneous due to INS autorestart in the attitude mode when other than straight and level, unaccelerated flight conditions existed.

C-30/GE

AIRSTART PROCEDURES GE100

To accomplish an airstart:

- 1. ENG CONT sw SEC (even if SEC caution light is on), then PRI. 1C 2
- 2. Airspeed Attain approx 250 kts or establish max range or endurance airspeed (200 or 170 kts, respectively, plus 5 kts per 1000 lb of fuel/store weights over C 1000, D zero lb) with JFS RUN light on. 3 4
- 3. JFS sw START 2 below 20,000 ft MSL and below 400 kts. 5
- 4. Stores Jettison (if required). 6 7

If engine FTIT exceeds 935°C:

- 5. Throttle OFF, then midrange. **8 9 C 10**
- 6. Airspeed Increase (400 kts/0.9 mach max).

If a hung start occurs:

7. ENG CONT sw - SEC, if in PRI; PRI, if in SEC. 11

If engine does not recover or if thrust is still insufficient to make a safe landing:

8. Refer to FLAMEOUT LANDING, page C-33.

If engine responds normally:

- 8. JFS sw OFF.
- 9. ELEC CAUTION RESET button Depress. 12
- 10. EPU sw OFF, then NORM.
- 11. ADI-Check for presence of OFF and/or AUX warning flags. 13 14 W.
- 12. Land as soon as possible.
- 13. Refer to ACTIVATED EPU/HYDRAZINE LEAK, page F-13.

OTHER CONSIDERATIONS:

- 1 Altitudes (overhead approach):
- High key 7000-10,000 ft AGL.
 Recommended altitude is 7000 ft AGL plus 500 ft per 1000 lb of fuel/store weights over C 1000, D zero lb.
- Low key 3000-5000 ft AGL.
 Recommended altitude is 3000 ft AGL plus 250 ft per 1000 lb of fuel/store weights over 1000, 2 zero lb.
- Base key 2000 ft AGL min.

Altitudes (straight-in approach):

- Clean glide 7000 ft AGL min at 8 nm.
- Lower LG 4000-8000 ft AGL at 4 nm.
 Delay lowering LG until initial aimpoint is 11°-17° below the horizon.
- **2** W Eject if a safe landing cannot be made. Ejection can be accomplished at any point in the pattern but do not delay ejection below 2000 ft AGL in an attempt to salvage a questionable approach.
- Increase airspeed by 5 kts per 1000 lb of fuel/store weights over C 1000, D zero lb. This airspeed equates to approx 7°AOA.
- During an airstart attempt, do not slow below the min airstart airspeed.
- **5 W** ◆ Min EPU fuel quantity without (with) JFS running:
- Overhead approach at high key 25 (20) percent.
- Straight-in approach:
 - o 8 nm 45 (40) percent.
 - 4 nm 25 (20) percent.
- ◆ The JFS alone does not provide adequate hydraulic pressure to land the aircraft.
- ◆ Do not start the JFS if engine seizure has occurred or is anticipated or if engine failure is a result of fuel starvation. Starting the JFS may result in no brake/JFS accumulator pressure for the brakes.
- ◆ If the JFS is erroneously placed to START 1, leave it there.
- ♦ If the JFS RUN light does not illuminate or goes off once illuminated, place the JFS sw to OFF and reattempt START 2 when the brake/JFS accumulators are recharged. The JFS sw does not relatch in either start position while the JFS is spooling down.

C-32/GE



FLAMEOUT LANDING GE100 1 2 W

- 1. Stores Jettison (if required).
- 2. Airspeed 200. **3 4**
- 3. EPU sw ON.
- 4. JFS sw START 2 below 20,000 feet MSL and below 400 knots. **5 W 6**
- 5. AIR SOURCE knob RAM (below 25,000 ft MSL).
- 6. DEFOG lever Forward.

(Cont)

C

FUEL/ STORE	ALTITUDE – FEET AGL		KIAS		
WT	HI	LOW	LG-UP	LG-DN	MIN
1000	7000	3000	200	190	180
2000	7500	3250	205	195	185
3000	8000	3500	210	200	190
4000	8500	3750	215	205	195
5000	9000	4000	220	210	200
6000	9500	4250	225	215	205
7000	10,000	4500	230	220	210
8000	10,500	4750	235	225	215



FUEL/ STORE	ALTITUDE – FEET AGL		KIAS		
WT	н	LOW	LG-UP	LG-DN	MIN
0000	7000	3000	200	190	180
1000	7500	3250	205	195	185
2000	8000	3500	210	200	190
3000	8500	3750	215	205	195
4000	9000	4000	220	210	200
5000	9500	4250	225	215	205
6000	10,000	4500	230	220	210
7000	10,500	4750	235	225	215
8000	11,000	5000	240	230	220

C-33/GE

OTHER CONSIDERATIONS:

- 7 W ◆ Do not delay lowering LG below 2000 ft AGL.
- ◆ If LG handle does not lower, select BRAKES CHAN 2 and position ALT FLAPS sw to EXTEND. Nozzle remains closed, resulting in higher than normal landing thrust.
- Alternate LG extension can be used up to 300 kts; however, the NLG may not fully extend until 190 kts. Time above 190 kts should be minimized in case there is a leak in the pneumatic lines.
- **9 C** ◆ NWS is not available following alternate LG extension.
- ◆ Do not depress the ALT GEAR reset button while pulling the ALT GEAR handle. This action may preclude successful LG extension.
- 10 Increase airspeed by 5 kts per 1000 lb of fuel/store weights over C 1000, D zero lb.
- 11 W Do not allow airspeed to decrease below 180 plus 5 kts per 1000 lb of fuel/store weights over C 1000, D zero lb.
- **12** C ◆ Brakes should be applied in a single, moderate, and steady application without cycling the antiskid.
- ◆ Touchdown skid control prevents brake application prior to wheel spin-up; however, brake pedal deflection of 1/16 inch causes a small flow of hydraulic fluid from the brake/JFS accumulators. To avoid depleting brake/JFS accumulator pressure, do not rest feet on the brake pedals.
- ◆ Do not attempt to taxi clear of the runway. Loss of brake/JFS accumulator pressure results in the inability to stop or steer the aircraft.



- 7. LG handle DN. (Use DN LOCK REL button if required.) **7 W**
- 8. ALT GEAR handle Pull (if required) (190 kts max, if practical). **8 9 C**
- 9. Airspeed 190 kts optimum in pattern. 10

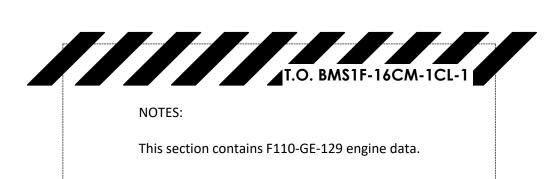
After touchdown:

10. HOOK sw - DN (if required).

If brake/JFS accumulator braking is used:

- 11. Stop straight ahead and engage parking brake. 12 C
- 12. Refer to ACTIVATED EPU/HYDRAZINE LEAK, page F-13.

T.O. BMS1F-16CM-1CL-1 NOTES: C-34.2/GE



C-1/GE29

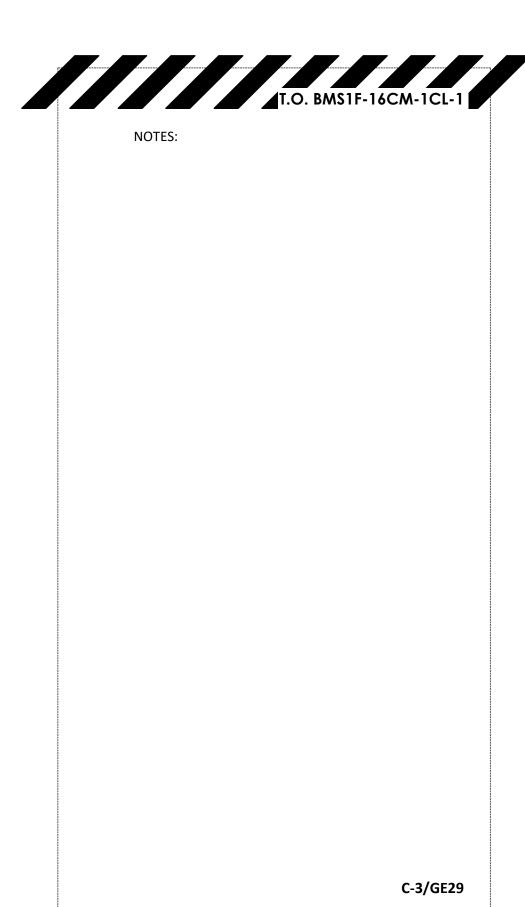
Engine Malfunctions GE129

ENG FIRE

1. If ENGINE is on, check RPM and FTIT indications. If RPM and FTIT indications are normal, land as soon as practical.

30011 d3 practical.	
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HUNG START/NO START	C-7/GE29
ENGINE AUTOACCELERATION	
(GROUND)	C-7/GE29
FIRE/OVERHEAT/FUEL LEAK	
(GROUND)	C-9/GE29
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C-2/GE29



OTHER CONSIDERATIONS:

- Hot start FTIT over 935°C. During engine start, if the FTIT increases through 750°C while engine rpm is less than 40 percent, a hot start can be anticipated.
- 2 Motor engine with JFS until FTIT reaches 200°C.

C-4/GE29



HOT START (GROUND) GE129 1

- 1. Throttle OFF.
- 2. FTIT indicator Monitor.

If FTIT remains above 500°C:

3. JFS sw – START 2. **2**

C-5/GE29

OTHER CONSIDERATIONS:

- Hung start RPM has stopped increasing below IDLE and FTIT is stabilized at less than 935°C.
- No start Light-off does not occur within 10 seconds.

C-6/GE29



HUNG START/NO START GE129 1

1. Throttle – OFF. Notify maintenance

ENGINE AUTOACCELERATION (GROUND) GE129

- 1. Throttle OFF.
- 2. FUEL MASTER sw OFF.

END

C-7/GE29



OTHER CONSIDERATIONS:

1 An engine or JFS fire/overheat can be detected by flames, smoke, explosion, signal from ground crew, or radio call. FTIT may exceed 935°C and, if ac power is available, ENG FIRE warning or OVERHEAT caution light may illuminate.

C-8/GE29

FIRE/OVERHEAT/FUEL LEAK (GROUND)

GE129 1

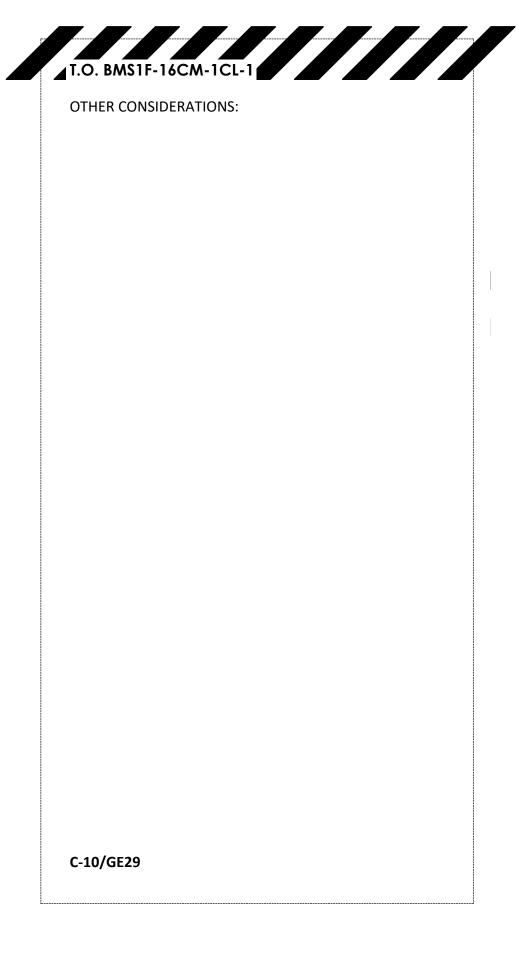
- 1. Throttle OFF.
- 2. JFS sw OFF.
- 3. FUEL MASTER sw OFF.
- 4. ENG FEED knob OFF (if external power applied).

If fire continues:

5. Abandon aircraft.

END

C-9/GE29





ENGINE FAILURE ON TAKEOFF GE129

If conditions permit:

1. Abort.

If conditions do not permit an abort:

- 1. Zoom.
- 2. Stores Jettison (if possible).
- 3. Eject.

END

C-11/GE29

OTHER CONSIDERATIONS:

- 1 Nozzle problems may inhibit AB capability as indicated by presence of the ENG AB FAIL PFL.
- In a partial thrust situation, thrust available may increase as altitude decreases. 250 kts approximates the airspeed at which thrust required for level flight is the lowest.
- Position the ENG CONT sw to SEC for a minimum of ½ sec, then immediately back to PRI.

C-12/GE29

AB MALFUNCTION ON TAKEOFF GE129

If decision is made to stop:

1. Abort.

If takeoff is continued:

- 2. Throttle MIL.
- 3. Stores Jettison (if required).

LOW THRUST ON TAKEOFF OR AT LOW **ALTITUDE (NON-AB) GE129**

If on takeoff and the decision is made to stop:

1. Abort.

If takeoff is continued and/or thrust is insufficient:

- 2. Throttle AB. 1
- 3. Stores Jettison (if required). 2

If thrust is insufficient to maintain level flight at a safe altitude:

3. ENG CONT sw - SEC (even if SEC caution light is on), then immediately back to PRI. 3 W 4

OTHER CONSIDERATIONS:

- 1 Maintain takeoff thrust until min recommended ejection altitude is attained and then throttle to min practical.
- 2 ◆ If fire occurred in AB, ENG FIRE warning light may not illuminate. Fire should extinguish after throttle is retarded; however, nozzle damage may result in lower than normal thrust.
- **3** Determine if fire and overheat detection circuits are functional.
- An in-flight fire may cause the degradation or failure of multiple systems. If time and conditions permit, attempt to determine the status of individual flight controls, speedbrakes, FLCS branches, and available thrust.

ENGINE FIRE GE129

If on takeoff and conditions permit:

1. Abort.

If takeoff is continued:

- 1. Climb. **1**
- 2. Stores Jettison (if required).

At a safe altitude:

3. Throttle – Min practical. 2

If ENG FIRE warning light goes off:

4. FIRE & OHEAT DETECT button – Depress. 3

If fire persists:

If fire indications cease:

5. Eject.

5. Land as soon as possible. 4 W

END

OTHER CONSIDERATIONS:

- **1** ◆ Determine if fire and overheat detection circuits are functional.
- **2** If the EPU was manually turned on, consider turning it off to determine if it is the source of the overheat condition. If the OVERHEAT caution light remains on, the EPU should be turned back on.
- **3** External fuel cannot be transferred in OFF or RAM. Consider jettisoning tank(s) to decrease drag if range is critical and the ECS cannot be turned on for short periods of time to transfer fuel.
- **4 W** ◆ With the ECS shut down or the AIR SOURCE knob in OFF or RAM, the g-suit does not inflate and PBG is disabled.
- **5 W** If LG handle does not lower, select BRAKES CHAN 2 and position ALT FLAPS sw to EXTEND. Nozzle remains closed, resulting in higher than normal landing thrust.

OVERHEAT CAUTION LIGHT GE129

Accomplish as many of the following as required to extinguish the caution light. If the light goes off, verify the integrity of the overheat detection circuit by depressing the FIRE & OHEAT DETECT button and land as soon as possible.

- 1. Throttle Min practical.
- 2. FIRE & OHEAT DETECT button Depress. 1

If OVERHEAT caution light extinguishes and detect circuit checks good:

3. Land as soon as possible.

If OVERHEAT caution light remains on (or detect circuit checks bad) and EPU is running:

3. EPU sw – OFF (if feasible). 2

If OVERHEAT caution light remains on (or detect circuit checks bad):

- 4. OXYGEN 100%.
- 5. AIR SOURCE knob OFF. **3 4 W**
- 6. Descend to below 25,000 ft and reduce airspeed to below 500 kts.

When airspeed is reduced and cockpit is depressurized:

- 7. AIR SOURCE knob RAM (below 25,000 ft). **3 4 W**
- 8. Nonessential electrical equipment Off.

If OVERHEAT caution light still remains on (or detect circuit checks bad):

- 9. TANK INERTING sw TANK INERTING even if Halon is not available.
- 10. LG Handle DN (300 kts/0.65 mach max). (Use DN LOCK REL button if required.) **5 W**
- 11. Land as soon as possible.

END

C-17/GE29

OTHER INDICATIONS:

- Below 15 psi at IDLE.
- Below 25 psi at MIL.
- Above 65 psi.
- Pressure fluctuations greater than ± 5 psi at IDLE or ±10 psi above IDLE.
- Lack of oil pressure rise when the rpm is increased.

OTHER CONSIDERATIONS:

- If the HYD/OIL PRESS warning light is illuminated with normal OIL and HYD pressure indications, suspect oil pressure sw failure or hydraulic pressure sw failure. Monitor OIL and HYD pressure indicators and land as soon as practical.
- 2 Monitor hydrazine use. If consumption rate is too high, cycle EPU sw to OFF, then NORM to conserve hydrazine. Be prepared to place EPU sw back to ON if the engine seizes.
- 3 C Throttle movement/rpm change may cause engine seizure.
- Plan to fly an SFO. Refer to FLAMEOUT LANDING, page C-33.
- 5 Though this is most likely a faulty indication, it is still possible that the indication reflects the actual condition; therefore, landing as soon as practical via a straight-in approach at a suitably configured airfield is recommended as a precaution.

C-18/GE29

ENGINE VIBRATIONS GE129

If vibrations persist:

- 1. Throttle Minimum practical.
- 2. Land as soon as possible.

OIL SYSTEM MALFUNCTION GE129

If an oil pressure malfunction is suspected:

1. Range - Maximize. 1 2 C

If the ENG LUBE LOW PFL occurs or oil pressure is low with the HYD/OIL PRESS warning light illuminated:

- 2. Stores Jettison (if required).
- 3. EPU sw ON, if oil pressure decreases below 10 psi. 3
- 4. Land as soon as possible. 4
- 5. Refer to ACTIVATED EPU/HYDRAZINE LEAK, page F-13.

If oil pressure is out of normal operating limits without an ENG LUBE LOW PFL present or HYD/OIL PRESS warning light illuminated:

2. Land as soon as practical. **5**

OTHER CONSIDERATIONS:

1 For serious hardware problems, the engine may operate normally at idle rpm but exhibit stall/vibration conditions at thrust settings above idle rpm. Use the highest thrust setting below the stall/vibration condition to sustain flight.

2 If stall(s) occurred in AB at 30,000 ft MSL or above and while subsonic, the engine is safe to operate in the IDLE to MIL range provided no other abnormal engine indications are observed.

C-20/GE29

ZERO RPM/ERRONEOUS RPM INDICATION GE129

If SEC caution light is illuminated:

1. Go to SEC CAUTION LIGHT, page C-29.

If SEC caution light is not illuminated:

1. Land as soon as practical.

ENGINE STALL RECOVERY GE129

If an AB stall(s) occurs:

1. Throttle – Snap to MIL.

If AB stalls do not clear or stall(s) occurs below AB:

2. Throttle – IDLE. 1

If stalls continue, or thrust is insufficient for a safe recovery:

3. Initiate AIRSTART PROCEDURES, page C-31.

If stall(s) clear:

3. Throttle - MIL or below. Minimize throttle movements and make necessary movements slowly. 2

If stall(s) occurred at MIL or below, or in AB below 30,000 ft MSL or while supersonic:

4. Land as soon as possible.

OTHER INDICATIONS:

- Engine oscillations.
- Insufficient thrust at MIL (with or without correct indications).
- Lack of response to throttle commands.
- Nozzle indicating or suspected full open or closed.

OTHER CONSIDERATIONS:

- **1** W ◆ Failure to monitor sink rate and height above terrain while applying low thrust recovery procedures can result in ejection outside ejection seat performance envelope.
- **2 C** ◆ If SEC caution light is on, refer to SEC CAUTION LIGHT, page C-29.
- ◆ Idle PRI thrust with nozzle closed is approx 50 percent greater than idle SEC thrust.
- **3 C** Retarding the throttle below MIL while supersonic may induce inlet buzz which produces severe cockpit vibration and probable engine stalls.
- 4 Transfer to SEC may be accomplished while supersonic if the throttle remains at MIL.
- **5** AB operation is inhibited and exhaust nozzle is closed.
- 6 During landing in SEC, idle thrust is approx twice that in PRI with a normal nozzle.
- **7** W Delaying engine shutdown can result in a long, fast landing. Wheel braking is less effective due to lack of WOW and there is an increased probability of a missed cable engagement.
- If engine does not respond, shut down the engine with the FUEL MASTER sw. At MIL, the engine flames out in approx 6 seconds. At IDLE, the engine flames out in approx 45 seconds.
- **9 W** The hook may miss the cable if the aircraft is not slow enough to compress the MLG struts sufficiently to make WOW or if forward stick pressure is held.

ABNORMAL ENGINE RESPONSE GE129

If abnormal engine response occurs: 1 W 2 C

If in AB or supersonic:

1. Throttle – Retard to MIL 3 C

If subsonic or problem still exists:

- 2. ENG CONT sw SEC. 4
- 3. Airspeed 250 kts (if thrust is too low to sustain level flight).
- 4. Throttle Verify engine responds normally to throttle movement from IDLE to MIL; set as desired. 5

If a safe landing can be made with the current thrust:

5. Land as soon as practical. **6**

If thrust is insufficient to make a safe landing or abnormal engine response is still present:

- 5. ENG CONT sw C DF PRI, DR NORM.
- 6. Land as soon as possible.

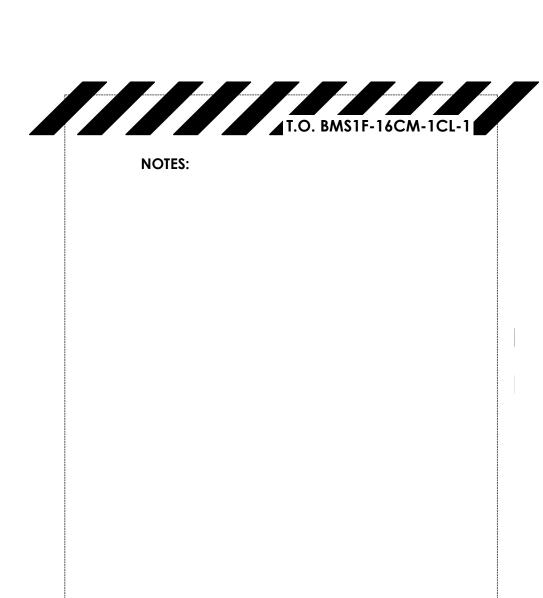
If thrust is too high to permit a safe landing:

5. Plan a flameout landing. Refer to FLAMEOUT LANDING, page C-33.

When landing is assured (normally high key): 7 W

- 6. Throttle OFF. 8
- 7. HOOK sw DN (if required). 9 W

T.O. BMS1F-16CM-1CL-1 OTHER CONSIDERATIONS: C-24/GE29



C-25/GE29

- 1 If stores jettison is attempted after main and standby generators drop off line but before EPU generator powers the SMS (approx 5 sec delay), stores will not jettison.
- **2** Visually confirm the stores have jettisoned and jettison again if required.
- **3 W** Below 4000 ft AGL, there may be insufficient time to perform an airstart prior to min recommended ejection altitude.
- **4 W** ◆ If the throttle is stuck and thrust is suitable for sustained flight, attempts to free the throttle should be delayed until within gliding distance of a suitable landing field.
- ◆ Extended AB use may result in unrecoverable trapped external fuel. Monitor internal fuel quantities to preclude unexpected engine flameout due to fuel starvation.
- **5 W** Delaying engine shutdown can result in a long, fast landing. Wheel braking is less effective due to lack of WOW and there is an increased probability of a missed cable engagement.
- At MIL, the engine flames out in approx 6 sec; at IDLE, the engine flames out in approx 45 sec. The engine will likely experience a stall and brief over temperature after the FUEL MASTER sw is placed to OFF.
- **7 W** The hook may miss the cable if the aircraft is not slow enough to compress the MLG struts sufficiently to make WOW or if forward stick pressure is held.



LOW ALTITUDE ENGINE FAILURE OR FLAMEOUT GE129

If low altitude engine failure or flameout occurs:

- 1. Zoom.
- 2. Stores Jettison (if required). 1 2
- 3. Perform airstart (if altitude permits), Refer to AIRSTART PROCEDURES, page C-31. **3** W

STUCK THROTTLE GE129

If throttle is stuck in AB:

1. ENG CONT sw - SEC.

After engine is operating in SEC or if throttle is stuck below AB: 4 W

- 2. Stores Jettison (if required).
- 3. Throttle Depress cutoff release, rotate throttle grip outboard and apply necessary force.

If throttle is still stuck:

4. Perform positive and negative g and sideslip maneuvers and attempt to move throttle.

If throttle is still stuck and thrust is too high to permit a safe landing:

 Plan a flameout landing. Refer to FLAMEOUT LANDING, page C-33, prior to placing FUEL MASTER sw off.

When prepared to land:

- EPU sw ON.
- 7. JFS sw START 2.

When at high key or within gliding distance of a suitable landing field: **5 W**

- 8. FUEL MASTER sw OFF. 6
- 9. HOOK sw DN (if required). **7 W**

END

C-27/GE29

OTHER CONSIDERATIONS:

- **1** C Retarding the throttle below MIL while supersonic may induce inlet buzz which produces severe cockpit vibration and probable engine stalls.
- 2 AB operation is inhibited and exhaust nozzle is closed.
- **3** The sw may remain in PRI or may be placed to SEC. If the sw is placed to SEC, do not place sw back to PRI.
- **4 W** Cycling the ENG CONT sw in an attempt to regain PRI may result in reoccurrence of the original malfunction or a more severe condition.
- **5** During landing in SEC, idle thrust is approx twice that in PRI with a normal nozzle.
- **6** W Failure to monitor sink rate and height above terrain while applying low thrust recovery procedures can result in ejection outside ejection seat performance envelope.
- A broken throttle cable or throttle linkage disconnect causes a transfer to SEC and abnormal engine response in SEC. Reselecting PRI restores normal engine operation for flight; however, engine shutdown after flight requires either use of the FUEL MASTER sw or maintenance personnel action to position the MEC throttle input shaft to off.
- **B** W Do not start the JFS if engine seizure has occurred or is anticipated or if engine failure is a result of fuel starvation. Starting the JFS may result in no brake/JFS accumulator pressure for the brakes.
- **9** W Delaying engine shutdown can result in a long, fast landing. Wheel braking is less effective due to lack of WOW and there is an increased probability of a missed cable engagement.
- **10** W If the engine does not respond, shut down the engine with the FUEL MASTER sw. At MIL, the engine flames out in approx 6 sec. At IDLE, the engine flames out in approx 45 sec.
- 11 W The hook may miss the cable if the aircraft is not slow enough to compress the MLG struts sufficiently to make WOW or if forward stick pressure is held.
- The failure condition no longer exists if the PFL is not present during the fault recall.

C-28/GE29

SEC CAUTION LIGHT GE129

If SEC caution light illuminates while supersonic:

1. Throttle – Do not retard below MIL until subsonic. 1 C

When subsonic or if SEC caution light illuminates while subsonic:

2. Throttle – Verify engine responds normally to throttle movement from IDLE to MIL; set as required. **2**

If the engine is operating normally in SEC:

- 3. ENG CONT sw -Do not cycle. 3 4 W
- 4. Land as soon practical. **5**

END

If the engine is operating abnormally in SEC: **6 W**

- 3. ENG CONT sw Position to SEC, then
 back to C DF PRI,
 DR NORM.
- 4. Airspeed 250 kts (If thrust is too low to sustain level flight).
- 5. Land as soon as possible. **7**

If thrust is too high to permit a safe landing: **8 W**

6. Plan a flameout landing. Refer to FLAME-OUT LANDING, page C-33. 9 W

When landing is assured (normally high key): 10

- 7. Throttle OFF. **11 W**
- 8. HOOK sw DN

END

ENGINE FAULT CAUTION LIGHT GE129

If ENGINE FAULT caution light illuminates:

- 1. PFLD Note PFL(s) displayed.
- 2. C DF F-ACK, DR FAULT ACK button Depress to acknowledge fault.
- 3. Refer to PILOT FAULT LIST ENGINE, page EP-12.
- 4. C DF F-ACK, DR FAULT ACK button Depress to perform fault recall. 12

END

C-29/GE29

OTHER CONSIDERATIONS:

1 W With engine failure or flameout, OBOGS is inoperative. Activate EOS if OXY LOW warning light illuminates above 10,000 ft cockpit altitude.

2 If at low altitude, position the ENG CONT sw to SEC for a min of 1/2 sec, then immediately back to PRI.

If not at low altitude, position the ENG CONT sw to SEC. If the engine does not show signs of recovery (increasing thrust or rpm/FTIT) within 10 sec, time and conditions permitting, return the ENG CONT sw to PRI.

Above 30,000 ft MSL, airspeeds in the 250-400 kts/0.9 mach range should be considered to reduce altitude and increase the probability of a successful airstart.

If max gliding range is not a factor, consider maintaining 250 knots or more above 10,000 ft AGL to provide best restart conditions (in case of JFS failure). Below 10,000 ft AGL with the JFS RUN light on, maintain max range or max endurance airspeed.

 $\boxed{\textbf{6}}$ If the JFS sw is erroneously placed to START 1, leave it there.

• If the JFS RUN light does not illuminate or goes off once illuminated, place the JFS sw to OFF and reattempt START 2 when the brake/JFS accumulators are recharged. The JFS sw does not relatch in either start position while the JFS is spooling down.

If stores jettison is attempted after main generator drops off line but before EPU generator powers the SMS (approx 5 sec delay), stores will not jettison.

8 Visually confirm the stores have jettisoned and jettison again if required.

Allow FTIT to drop below 700°C before advancing the throttle.

10 C FTIT should decrease rapidly when throttle is OFF. If FTIT does not decrease rapidly, verify the throttle is OFF.

• Do not mistake a rapid initial FTIT increase during an airstart as an indication of a hot start.

11 Typically, airstarts are characterized by rapidly increasing FTIT with a slow increase in rpm.

12 Stay in the mode that successfully restarts the engine.

• The proximity of the ENG CONT sw to the JFS sw makes the JFS sw susceptible to being bumped to OFF when selecting SEC.

13 Verify MAIN GEN and STBY GEN lights are off.

14 If warning flag(s) is in view, refer to TOTAL INS FAILURE, page F-29.

15 W If only AUX flag is in view, pitch and roll attitude information is likely to be erroneous due to INS autorestart in the attitude mode when other than straight and level, unaccelerated flight conditions existed.

C-30/GE29

AIRSTART PROCEDURES GE129 1 W

To accomplish an airstart:

- 1. ENG CONT sw SEC (even if SEC caution light is on), then PRI. **2** C **3**
- 2. Airspeed Attain approx 250 kts or establish max range or endurance airspeed (200 or 170 kts, respectively, plus 5 kts per 1000 lb of fuel/store weights over C 1000, D zero lb) with JFS RUN light on. 4 5
- 3. JFS sw START 2 below 20,000 ft MSL and below 400 kts. **6**
- 4. Stores Jettison (if required). 7

If engine FTIT exceeds 935°C:

- 5. Throttle OFF, then midrange. **8 10 C 11**
- 6. Airspeed Increase (400 kts/0.9 mach max).

If a hung start occurs:

7. ENG CONT sw - SEC, if in PRI; PRI, if in SEC. 12

If engine does not recover or if thrust is still insufficient to make a safe landing:

8. Refer to FLAMEOUT LANDING, page C-33.

If engine responds normally:

- 8. JFS sw OFF.
- 9. ELEC CAUTION RESET button Depress. 13
- 10. EPU sw OFF, then NORM.
- 11. ADI-Check for presence of OFF and/or AUX warning flags. 14 15 W.
- 12. Land as soon as possible.
- 13. Refer to ACTIVATED EPU/HYDRAZINE LEAK, page F-13.

OTHER CONSIDERATIONS:

- 1 Altitudes (overhead approach):
- High key 7000-10,000 ft AGL.
 Recommended altitude is 7000 ft AGL plus 500 ft per 1000 lb of fuel/store weights over C 1000, D zero lb.
- Low key 3000-5000 ft AGL.
 Recommended altitude is 3000 ft AGL plus 250 ft per 1000 lb of fuel/store weights over 1000, 2 zero lb.
- Base key 2000 ft AGL min.

Altitudes (straight-in approach):

- Clean glide 7000 ft AGL min at 8 nm.
- Lower LG 4000-8000 ft AGL at 4 nm.
 Delay lowering LG until initial aimpoint is 11°-17° below the horizon.
- **2** W Eject if a safe landing cannot be made. Ejection can be accomplished at any point in the pattern but do not delay ejection below 2000 ft AGL in an attempt to salvage a questionable approach.
- Increase airspeed by 5 kts per 1000 lb of fuel/store weights over 1000, D zero lb. This airspeed equates to approx 7°AOA.
- During an airstart attempt, do not slow below the min airstart airspeed.
- **5 W** ◆ Min EPU fuel quantity without (with) JFS running:
- Overhead approach at high key 25 (20) percent.
- Straight-in approach:
 - o 8 nm 45 (40) percent.
 - 4 nm 25 (20) percent.
- ◆ The JFS alone does not provide adequate hydraulic pressure to land the aircraft.
- ◆ Do not start the JFS if engine seizure has occurred or is anticipated or if engine failure is a result of fuel starvation. Starting the JFS may result in no brake/JFS accumulator pressure for the brakes.
- ◆ If the JFS is erroneously placed to START 1, leave it there.
- ♦ If the JFS RUN light does not illuminate or goes off once illuminated, place the JFS sw to OFF and reattempt START 2 when the brake/JFS accumulators are recharged. The JFS sw does not relatch in either start position while the JFS is spooling down.

C-32/GE29



FLAMEOUT LANDING GE129 1 2 W

- 1. Stores Jettison (if required).
- 2. Airspeed 200. **3 4**
- 3. EPU sw ON.
- 4. JFS sw START 2 below 20,000 feet MSL and below 400 knots. **5 W 6**
- 5. AIR SOURCE knob RAM (below 25,000 ft MSL).
- 6. DEFOG lever Forward.

(Cont)

C

FUEL/ STORE	ALTITUDE – FEET AGL		KIAS		
WT	HI	LOW	LG-UP	LG-DN	MIN
1000	7000	3000	200	190	180
2000	7500	3250	205	195	185
3000	8000	3500	210	200	190
4000	8500	3750	215	205	195
5000	9000	4000	220	210	200
6000	9500	4250	225	215	205
7000	10,000	4500	230	220	210
8000	10,500	4750	235	225	215



FUEL/ STORE	ALTITUDE – FEET AGL		KIAS		
WT	н	LOW	LG-UP	LG-DN	MIN
0000	7000	3000	200	190	180
1000	7500	3250	205	195	185
2000	8000	3500	210	200	190
3000	8500	3750	215	205	195
4000	9000	4000	220	210	200
5000	9500	4250	225	215	205
6000	10,000	4500	230	220	210
7000	10,500	4750	235	225	215
8000	11,000	5000	240	230	220

C-33/GE29

T.O. BMS1F-16CM-1CL-1

OTHER CONSIDERATIONS:

- 7 W ◆ Do not delay lowering LG below 2000 ft AGL.
- ◆ If LG handle does not lower, select BRAKES CHAN 2 and position ALT FLAPS sw to EXTEND. Nozzle remains closed, resulting in higher than normal landing thrust.
- Alternate LG extension can be used up to 300 kts; however, the NLG may not fully extend until 190 kts. Time above 190 kts should be minimized in case there is a leak in the pneumatic lines.
- **9 C** ◆ NWS is not available following alternate LG extension.
- ◆ Do not depress the ALT GEAR reset button while pulling the ALT GEAR handle. This action may preclude successful LG extension.
- 10 Increase airspeed by 5 kts per 1000 lb of fuel/store weights over C 1000, D zero lb.
- 11 W Do not allow airspeed to decrease below 180 plus 5 kts per 1000 lb of fuel/store weights over C 1000, D zero lb.
- **12** C ◆ Brakes should be applied in a single, moderate, and steady application without cycling the antiskid.
- ◆ Touchdown skid control prevents brake application prior to wheel spin-up; however, brake pedal deflection of 1/16 inch causes a small flow of hydraulic fluid from the brake/JFS accumulators. To avoid depleting brake/JFS accumulator pressure, do not rest feet on the brake pedals.
- ◆ Do not attempt to taxi clear of the runway. Loss of brake/JFS accumulator pressure results in the inability to stop or steer the aircraft.



- 7. LG handle DN. (Use DN LOCK REL button if required.) **7 W**
- 8. ALT GEAR handle Pull (if required) (190 kts max, if practical). **8 9 C**
- 9. Airspeed 190 kts optimum in pattern. 10 11 W

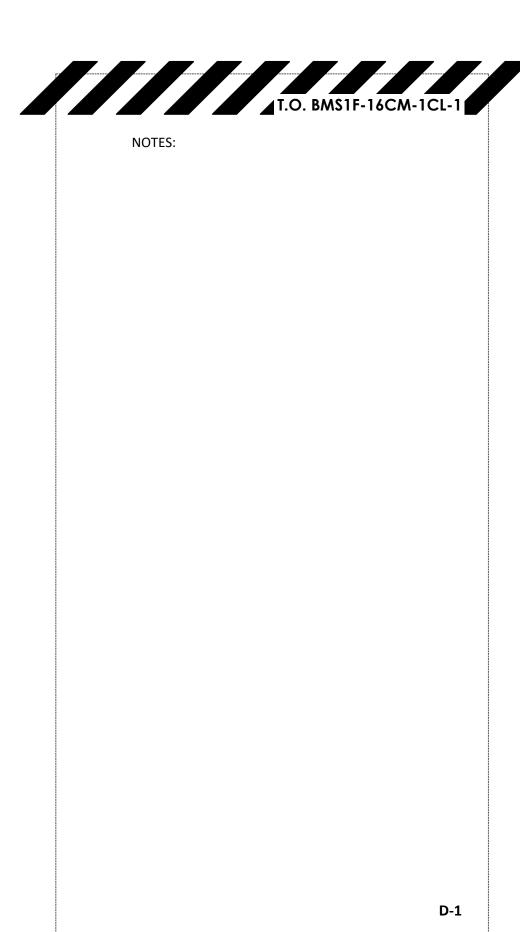
After touchdown:

10. HOOK sw - DN (if required).

If brake/JFS accumulator braking is used:

- 11. Stop straight ahead and engage parking brake. 12 C
- 12. Refer to ACTIVATED EPU/HYDRAZINE LEAK, page F-13.

T.O. BMS1F-16CM-1CL-1 NOTES: C-34.2/GE29



T.O. BMS1F-16CM-1CL-1

Fuel/Hydraulic Malfunctions

RED ZONE ON AL POINTER	FUEL IMBALANCE	D-5			
FWD FUEL LOW AND/OR AFT FUEL LOW	FUEL LOW	D-7			
TOTALIZER AND POINTERS DO NOT AGREE BELOW 5700 (D 4500) LB	TRAPPED EXT. FUEL	D-9			
ABNORMALLY DECREASING TOTALIZER	FUEL LEAK	D-11			
FUEL/OIL HOT	HOT FUEL/OIL OR GRAVITY FEED	D-13			
FUEL MANAGEMENT SYSTEM PFL					
HYD/OIL PRESS FLCS FAULT	OIL SYSTEM MALFUNCTION	D-13			
ONE HYD PRESS I EPU RUN LIGHT (ISA ALL FAIL PFL					
HADBVIIIC OA	EDDDESCIIDE	D 15			

HYD/OIL PRESS FLCS FAULT	DUAL HYDRAULIC MALFUNCTIOND-17
B HYD PRESS IN	DICATOR LOW
EPU RUN LIGHT	ON
ISA ALL FAIL PFL	
HYD/OIL PRESS ELEC SYS	SYSTEM B AND GENERATOR FAILURE (PTO SHAFT)
FLCS FAULT FLCS PMG MAIN GEN STBY GEN	

B HYD PRESS INDICATOR LOW EPU RUN LIGHT ON ISA ALL FAIL PFL

OTHER CONSIDERATIONS:

1 A fuel imbalance when not carrWING an external fuel tank(s) indicates a system malfunction. A fuel imbalance when carrWING an external fuel tank(s) may be the result of normal system operating tolerances.

2 Any correction required per total fuel quantity usage with internal fuel only indicates a system malfunction.

- More than one correction per total fuel quantity usage with either a 300-gallon fuel tank or two 370-gallon fuel tanks indicates a system malfunction.
- More than two corrections per total fuel quantity usage with either a 300-gallon fuel tank and two 370-gallon fuel tanks or two 600-gallon fuel tanks indicate a system malfunction.
- More than three corrections per total fuel quantity usage with a 300-gallon fuel tank and two 600-gallon fuel tanks indicate a system malfunction.

3 W Limit fuel flow to the min required to sustain flight while the cause is determined. Avoid negative g flight when either reservoir is not full.

4 W Aft fuel heavy (red portion of AL pointer showing) results in increased susceptibility to departure and deep stall conditions. Limit AOA and avoid max command rolling maneuvers.

5 Indicated by abnormally high fuel flow, by totalizer decreasing at abnormal rate, or by visual means.

6 C If two-point aerodynamic braking is used with an aft CG, pitch overshoots may occur and the nozzle, speedbrakes, and ventral fins may contact the runway.

7 Do not crossfeed.

8 Use the FUEL QTY SEL knob to determine if a trapped fuel condition exists. Refer to TRAPPED EXTERNAL FUEL, page D-9, if required.

Use only to correct a forward and aft fuselage fuel imbalance and not to correct imbalances between reservoirs. Do not exceed 25,000 pph fuel flow while balancing fuel.

FUEL IMBALANCE 1 2

If fuel imbalance is indicated by AL and FR pointers with FUEL QTY SEL knob in NORM:

1. Fuel flow – Reduce to the min required to sustain flight below 6000 pph. **3** W

If aft fuel imbalance exists (aft CK):

2. AOA – 15° max. 4 W

If a fuel leak is suspected: **5**

3. Go to FUEL LEAK, page D-11.

If a fuel leak is not suspected:

3. FUEL QTY SEL knob - TEST.

If AL and FR pointers test bad or if a fuel sensing problem is suspected:

4. Land as soon as practical. 6 C 7

If AL and FR pointers test good:

- 4. Fuel quantities Check. **8**
- 5. ENG FEED knob FWD or AFT. 9

If imbalance is not corrected:

6. Land as soon as practical. 6 C

END

If proper distribution is attained:

- 6. ENG FEED knob NORM.
- 7. Fuel balance Monitor.

OTHER INDICATIONS:

- A fuel low caution light may be caused by a fuel leak, trapped external fuel, a fuel imbalance between the forward and aft systems, prolonged AB operation, or a fuel sensing problem.
- The FYD FUEL LOW and AFT FUEL LOW caution lights indicate reservoir tank quantities are less than:

D

FYD 400 pounds FYD 250 pounds

AFT 250 pounds AFT 400 pounds

OTHER CONSIDERATIONS:

C

- **1 W** Limit fuel flow to the min required to sustain flight while the cause of the fuel low light(s) is determined. Avoid negative g flight when either reservoir is not full.
- Leave FUEL QTY SEL knob out of NORM if FUEL quantity indicator displays erroneous information.
- **3** Fuel flow indications may fluctuate with either reservoir empty.
- 4 Consider an SFO. Refer to FLAMEOUT LANDING, page C-33.
- 5 Indicated by abnormally high fuel flow, by totalizer decreasing at abnormal rate, or by visual means.
- 6 A fuel line between the reservoir and FFP may be ruptured, causing fuel to cycle between tanks in the same system.
- Monitor reservoir tanks to insure they are maintained full.

FUEL LOW

If FWD FUEL LOW and/or AFT FUEL LOW caution light illuminates:

- 1. Fuel flow Reduce to the min required to sustain flight below 6000 pph. $\boxed{1 \text{ W}}$
- 2. ENG FEED knob NORM.
- 3. FUEL QTY SEL knob RSVR. 2

If either or both reservoir tanks are low: **3**

4. Land as soon as possible. 4

If a fuel leak is suspected **5**:

5. Go to FUEL LEAK, page D-11.

If external fuel has not transferred:

6. Go to TRAPPED EXTERNAL FUEL, page D-9.

If forward and aft fuselage fuel is not properly balanced:

7. Go to FUEL IMBAL-ANCE, page D-5.

If fuel is properly balanced: **6**

8. Land as soon as possible.

END

If proper distribution is attained:

4. FUEL QTY SEL knob – TEST.

If AL and/or FR pointers test bad, or FUEL quantity indicator is inoperative:

5. Land as soon as possible. 4

If AL and FR pointers test good:

- 6. Individual fuel quantities - Check and compare with totalizer. 7
- 7. Land as soon as practical.

OTHER CONSIDERATIONS:

1 W A TRP FUEL indication in the HUD may be a symptom of an external fuel leak. If a fuel leak is suspected (indicated by abnormally high fuel flow, by totalizer decreasing at abnormal rate, or by visual means), refer to FUEL LEAK, page D-11.

- With trapped external fuel, the totalizer does not indicate total usable fuel. Usable fuel is the totalizer quantity less the external fuel quantity.
- 2 Repeating or undoing any steps may delay transfer.
- 3 This action usually increases ECS air pressure for external fuel transfer
- Selecting WING FIRST bypasses electrical components that, if malfunctioning, can prevent fuel transfer from external wing tanks, the centerline tank, or all three external tanks. With a three tank configuration, the first indication that the centerline tank is feeding is after the external wing tanks are emptied.
- 5 Open or close AR door at or below 400 kts/0.85 mach.
- The time required to observe fuel transfer if the malfunction is corrected can vary from 1-3 minutes (for a full centerline tank) to 10-12 minutes (for three external tanks with 500 lb fuel in each) if reservoir tanks are full (i.e., both air ejectors are off).
- | \begin{align*} | \beg
- If trapped external fuel occurs after air refueling and completion of checklist steps did not correct the malfunction, consider descending well below the freezing level to unfreeze the external pressurization and vent valve. Cycling the AR door at lower altitude may restore normal operation.
- 9 If a fuel imbalance in the external wing tanks exceeds 1700 lbs, or any additional asymmetry exists, refer to ASYMMETRIC STORES (LANDING), page F-35.

TRAPPED EXTERNAL FUEL 1 W

Accomplish steps 1 through 8 and 9 (if required) without delay: 2

- 1. Fuel flow Minimize.
- 2. AIR REFUEL sw Confirm in CLOSE.
- 3. AIR SOURCE knob Confirm in NORM or DUMP.
- 4. TEMP knob MAN and adjust for comfort. 3
- 5. TANK INERTING sw TANK INERTING to reduce internal tank pressurization.
- 6. EXT FUEL TRANS sw WING FIRST. 4
- 7. ENG FEED knob NORM.
- 8. Stick Pulse aircraft in pitch several times by applying differential g forces of approx ± 2g.

If the AIR REFUEL sw was initially found in CLOSE (step 2), perform step 9. If the AIR REFUEL sw was initially found in OPEN (step 2), omit step 9.

- 9. AIR REFUEL sw OPEN (1 sec), then CLOSE. 5
- 10. External tank fuel quantity Monitor. 6 7 W
- 11. Stores Jettison (if required). 9

OTHER CONSIDERATIONS:

- Indicated by abnormally high fuel flow, by totalizer decreasing at abnormal rate, or by visual means.
- 2 If a suitable landing field is not within gliding distance, consider increasing airspeed and altitude (without the use of AB) to maximize range by using fuel which would otherwise be lost.
- **3 W** Avoid negative g flight when either reservoir is not full.
- 4 Leak is in the engine feed line or engine components.
- **5** Consider stores jettison if range is critical. Consider an SFO. Refer to FLAMEOUT LANDING, page C-33.
- **6** This action stops automatic forward fuel transfer.
- **7** Consider stores jettison if range is critical.
- **8 W** Aft fuel heavy (red portion of AL pointer showing) results in increased susceptibility to departure and deep stall conditions. Limit AOA and avoid max command rolling maneuvers.
- **9 C** If two-point aerodynamic braking is used with an aft CG, pitch overshoots may occur and the nozzle, speedbrakes, and ventral fins may contact the runway.

FUEL LEAK

If a fuel leak is suspected: 1

1. Range – Maximize. 2 3 W

If fuel flow is abnormally high:

- 2. ENG FEED knob OFF. 4
- 3. Land as soon as possible. **5**

END

If fuel flow is normal:

2. ENG FEED knob – NORM.

If leak is from the forward system:

3. FUEL QTY SEL knob – Out of NORM. 6

If external tanks contain fuel:

 TANK INERTING sw – TANK INERTING to reduce internal tank pressurization.

If external tanks are not installed or when they are empty:

- 5. AIR REFUEL sw OPEN.
- 6. Land as soon as possible. **7**

If aft fuel imbalance exists (aft CK):

7. AOA – 15° max. **8 W 9 C**END

D-11

OTHER INDICATIONS:

• Main and standby generator failure with either hydraulic system A or FFP failure.

OTHER CONSIDERATIONS:

1W ◆ Engine flameout may occur at low fuel flow rates when in a hot fuel situation.

- ◆ Engine flameout may occur when either reservoir tank empties if a gravity feed condition exists.
- 2 Minimize aircraft maneuvering for duration of flight.
- **3** Consider an SFO. Refer to FLAMEOUT LANDING, page C-33.
- An FMS FAIL PFL indicates that the fuel reference voltage supplied to the MMC is out of tolerance. Fuel system effects associated with the PFL range from degraded fuel computations (e.g., BINGO fuel) to degradation/failure of the fuel quantity indicating system.
- **5** Fuel low caution light operation is not affected by reference voltage error.

HOT FUEL/OIL OR GRAVITY FEED

If FUEL/OIL HOT caution light illuminates or gravity feed situation exists: **1 W**

- 1. AIR REFUEL sw Check CLOSE.
- 2. TANK INERTING sw Check OFF.
- 3. Altitude 10,000 ft max (if practical). 2
- 4. Fuel flow 4000 pph min until landing is assured when in a hot fuel situation.

If FUEL/OIL HOT caution light goes off:

5. Land as soon as practical.

END

If FUEL/OIL HOT caution light remains on or gravity feed situation exists:

5. Land as soon as possible. **3**

END

FUEL MANAGEMENT SYSTEM PFL

If an FMS FAIL PFL occurs: 4

1. FUEL QTY SEL knob - TEST.

If FUEL quantity indicator tests good:

2. FUEL quantity indicator – Monitor.

If FUEL quantity indicator tests bad:

2. Land as soon as practical. **5**

INOPERATIVE EQUIPMENT:

- HYD SYS A Speedbrakes, FFP.
- HYD SYS B Normal braking, NWS, AR door, gun, normal LG extension.

OTHER INDICATIONS:

 A hydraulic system failure is indicated by illumination of the HYD/OIL PRESS warning light, FLCS FAULT caution light, and ISA ALL FAIL PFL.

OTHER CONSIDERATIONS:

- 1 Hydraulic system overpressure is indicated by a steady state hydraulic pressure indication above 3250 psi.
- **2 W** If hydraulic failure is due to structural damage (e.g., battle damage, midair collision, bird strike, fire, or hard landing), the other system may be damaged and failure can occur with little warning. The HYD PRESS indicator may show normal pressure until system fluid is depleted.
- Make smooth control inputs and plan to fly a straight-in approach.
- 4 Fuel distribution must be controlled manually.
- **EPU** RUN light on may indicate a dual hydraulic or PTO shaft failure.
- Alternate LG extension can be used up to 300 kts; however, the NLG may not fully extend until 190 kts. Time above 190 kts should be minimized in case there is a leak in the pneumatic lines.
- **7 C** ◆ NWS is not available following alternate LG extension.
- ◆ Do not depress the ALT GEAR reset button while pulling the ALT GEAR handle. This action may preclude successful LG extension.
- **8** W If LG handle does not lower, select BRAKES CHAN 2 and position ALT FLAPS sw to EXTEND.
- **PW220** / **PW229** Nozzle remains closed, resulting in higher than normal landing thrust.

HYDRAULIC SYSTEM OVERPRESSURE

If one hydraulic system indicates overpressure: 1

1. Land as soon as practical.

If both hydraulic systems indicate overpressure:

2. Land as soon as possible.

SINGLE HYDRAULIC FAILURE 2W

System A Failure

- 1. Land as soon as practical. 3
- 2. System B HYD PRESS indicator Monitor.
- 3. Fuel balance Monitor. 4

System B Failure 5

- 1. Land as soon as practical. 3
- 2. ALT GEAR handle Pull (190 kts max, if practical). 6 7 C
- 3. LG Handle DN. (Use DN LOCK REL button if required.) **8 W**

(Cont)

OTHER CONSIDERATIONS:

9 Braking is available using brake/JFS accumulators only. To avoid depleting the brake/JFS accumulators, do not rest feet on the brake pedals. If the brake/JFS accumulators are depleted or if directional control may be a problem, consider an approach-end arrestment. Refer to CABLE ARRESTMENT, page F-11.

10 C ◆ Brakes should be applied in a single, moderate, and steady application without cycling the antiskid.

- ◆ Touchdown skid control prevents brake application prior to wheel spin-up; however, brake pedal deflection of 1/16 inch causes a small flow of hydraulic fluid from the brake/JFS accumulators. To avoid depleting brake/JFS accumulator pressure, do not rest feet on the brake pedals.
- ◆ Do not attempt to taxi clear of the runway. Loss of brake/JFS accumulator pressure results in the inability to stop or steer the aircraft.

4. HOOK sw – DN (if required). 9

After landing:

5. Stop straight ahead and engage parking brake. 10 C

OTHER INDICATIONS:

- Sluggishness or lack of response to flight control inputs; decreasing hydraulic pressures.
- A hydraulic system failure is indicated by illumination of the HYD/OIL PRESS warning light, FLCS FAULT caution light, and ISA ALL FAIL PFL.

MAJOR INOPERATIVE EQUIPMENT:

 $\bullet\ \ \$ HYD SYS B — Normal braking, NWS, AR door, gun, and normal LG extension.

OTHER CONSIDERATIONS:

- 1 Before landing, confirm that the EPU operates (EPU run light on) with the throttle in IDLE. If the EPU run light goes off, refer to ABNORMAL EPU OPERATION, page A17.
- 2 Make smooth control inputs and plan to fly a straight-in approach.
- Alternate LG extension can be used up to 300 kts; however, the NLG may not fully extend until 190 kts. Time above 190 kts should be minimized in case there is a leak in the pneumatic lines.
- **4** C ◆ NWS is not available following alternate LG extension.
- ◆ Do not depress the ALT GEAR reset button while pulling the ALT GEAR handle. This action may preclude successful LG extension.
- **5** W If LG handle does not lower, select BRAKES CHAN 2 and position ALT FLAPS sw to EXTEND. **PW220** / **PW229** Nozzle idle area reset is not available resulting in higher than normal landing thrust.
- 6 Braking is available using brake/JFS accumulators only. To avoid depleting the brake/JFS accumulators, do not rest feet on the brake pedals. If the brake/JFS accumulators are depleted or if directional control may be a problem, consider an approach-end arrestment. Refer to CABLE ARRESTMENT, page F-13.
- **7** C ◆ Brakes should be applied in a single, moderate, and steady application without cycling the antiskid.
- ◆ Touchdown skid control prevents brake application prior to wheel spin-up; however, brake pedal deflection of 1/16 inch causes a small flow of hydraulic fluid from the brake/JFS accumulators. To avoid depleting brake/JFS accumulator pressure, do not rest feet on the brake pedals.
- Do not attempt to taxi clear of the runway. Loss of brake/JFS accumulator pressure results in the inability to stop or steer the aircraft.

DUAL HYDRAULIC FAILURE

- 1. EPU sw ON (if EPU run light is off).
- 2. System A HYD PRESS indicator Check pressure increasing.

If hydraulic pressure does not increase or control response is lost:

3. Eject.

If system A hydraulic pressure is restored:

- 3. EPU run light Check light on at idle thrust. 1
- 4. Land as soon as possible. 2
- 5. ALT GEAR handle Pull (190 kts max, if practical). **3 4 C**
- 6. LG Handle DN. (Use DN LOCK REL button if required.) **5 W**
- 7. HOOK sw DN (if required). **6**

After landing:

- 8. Stop straight ahead and engage parking brake. **7** C
- 9. Refer to ACTIVATED EPU/HYDRAZINE LEAK, page F-13.

MAJOR INOPERATIVE EQUIPMENT:

- MAIN GEN FCR, MFD's, FCC.
- HYD SYS B Normal braking, NWS, AR door, gun, and normal LG extension.
- STBY GEN/FLCS PMG.
- Go to EMERGENCY POWER DISTRIBUTION, page A-20, for other systems lost.

OTHER CONSIDERATIONS:

- 1 C Stall protection may be lost. Do not retard throttle below MIL until subsonic.
- **2** C If warning flag(s) is in view, refer to EGI FAILURE, page F-29.
- **3** W If only AUX flag is in view, pitch and roll attitude information is likely to be erroneous due to INS autorestart in the attitude mode when other than straight and level, unaccelerated flight conditions existed.
- 4 DEEC stall protection may be lost. Do not retard throttle below MIL until subsonic.
- Before landing, confirm that the EPU operates (EPU run light is on) with the throttle in IDLE. If the EPU run light goes off, immediately advance the throttle since underspeed of the EPU results in loss-of-control. Maintain throttle setting which keeps EPU run light on until after touchdown.
- 6 Make smooth control inputs and plan to fly a straight-in approach.
- Alternate LG extension can be used up to 300 kts; however, the NLG may not fully extend until 190 kts. Time above 190 kts should be minimized in case there is a leak in the pneumatic lines.
- **8 C** ◆ NWS is not available following alternate LG extension.
- ◆ Do not depress the ALT GEAR reset button while pulling the ALT GEAR handle. This action may preclude successful LG extension.
- 9 W If LG handle does not lower, select BRAKES CHAN 2 and position ALT FLAPS sw to EXTEND. PW220 / PW229 Nozzle remains closed resulting in higher than normal landing thrust.
- 10 Braking is available using brake/JFS accumulators only. To avoid depleting the brake/JFS accumulators, do not rest feet on the brake pedals. If the brake/JFS accumulators are depleted or if directional control may be a problem, consider an approach-end arrestment. Refer to CABLE ARRESTMENT, page F-13.
- 11 C ◆ Brakes should be applied in a single, moderate, and steady application without cycling the antiskid.
- ◆ Touchdown skid control prevents brake application prior to wheel spin-up; however, brake pedal deflection of 1/16 inch causes a small flow of hydraulic fluid from the brake/JFS accumulators. To avoid depleting brake/JFS accumulator pressure, do not rest feet on the brake pedals.
- Do not attempt to taxi clear of the runway. Loss of brake/JFS accumulator pressure results in the inability to stop or steer the aircraft.

SYSTEM B AND GENERATOR FAILURE (PTO SHAFT)

1. EPU sw – ON (if EPU run light is off).

If EPU run light is off and control response is lost:

2. Eject.

If EPU run light is on:

- 3. Throttle As required. 1 C
- 4. ADI Check for presence of OFF and/or AUX warning flags. 2 3 W
- 5. **PW220** AB RESET sw AB RESET, then NORM. **4 C**
- 6. Fuel balance Monitor.
- 7. EPU run light Check light on at idle thrust. 5
- 8. Land as soon as possible. 6
- 9. ALT GEAR handle Pull (190 kts max, if practical). **7 8 C**
- 10. LG Handle DN. (Use DN LOCK REL button if required.) 9 W
- 11. HOOK sw DN (if required). 10

After landing:

- 12. Stop straight ahead and engage parking brake. 11 C
- 13. EPU sw OFF.
- 14. Refer to ACTIVATED EPU/HYDRAZINE LEAK, page F-13.

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	IOTES:				
D	-20				



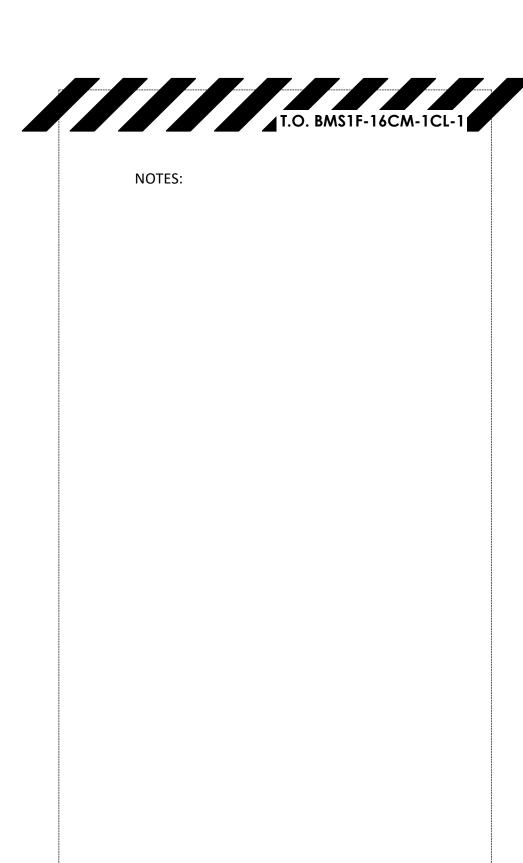
NOTES:

E-1

T.O. BMS1F-16CM-1CL-1

Landing Gear Malfunctions

LG HANDLE	WILL NOT RAISE	E-5
LG FAILS TO	RETRACT	E-7
BLOWN TIRE	E ON TAKEOFF	E-7
LANDING W	VITH A BLOWN TIRE	E-9
LG HANDLE	WILL NOT LOWER	E-11
	EXTEND/ABNORMAL	
INDICAT	TONS	E-11
	LG EXTENSION	
	VITH LG UNSAFE/UP	
	URE	
	SWITCH FAILURE	
NWS FAIL	NWS FAILURE	GO TO F-15
ANTI	ANTISKID	
SKID	MALEUNICTION	COTOF0



T.O. BMS1F-16CM-1CL-1

OTHER CONSIDERATIONS:

1 TO/LDG CONFIG light is on if left MLG WOW sw has failed.

2 W If LG handle does not lower, select BRAKES CHAN 2 and position ALT FLAPS sw to EXTEND. PW 220 / PW229 Nozzle remains closed, resulting in higher than normal landing thrust.

Touchdown antiskid protection may not be available. Landing with feet on the brake pedals may result in blown tire(s).

LG HANDLE WILL NOT RAISE

If conditions permit:

- 1. Airspeed 300 kts max.
- 2. GW Reduce prior to landing.

If LK must be raised:

- 1. LG Handle DN LOCK REL button Depress.
- 2. LG Handle UP. 1

When desired:

3. LG Handle – DN. (Use DN LOCK REL button if required.)

If LK indicates safe:

4. Land normally.

After touchdown:

5. Brakes – Apply after wheels spin up. **2 C**

OTHER CONSIDERATIONS:

1 W If LG handle does not lower, select BRAKES CHAN 2 and position ALT FLAPS sw to EXTEND. Nozzle remains closed, resulting in higher than normal landing thrust.

2 C Do not cycle the LG handle. Damage to LG or LG doors may result.

3 W Aborting takeoff at high speed with a blown tire may be

more dangerous than continuing takeoff. For heavy weight takeoffs, an abort at high speed with a blown tire is extremely dangerous because braking and directional control are impaired. The primary response to a blown tire at high speed (i.e., greater than 100 knots) should be to check engine instruments and continue the takeoff if the engine is operating normally. If takeoff is continued, do not retract the LG, reduce GW if practical, and prepare to land as soon as practical.

4 The decision to take off or abort depends on the speed at the time of the failure, GW, stopping distance required, and arresting gear availability.

5 W If a blown NLG tire occurred and NWS is not available, it may not be possible to prevent departure from the runway. A reverse castering effect may occur in which the nosewheel moves opposite to the rudder or differential braking input.

6 C With a blown tire, avoid centerline lights as they may cause wheel damage and subsequent loss of directional control. Failure to use full aft stick with a blown NLG tire may lead to wheel failure and directional control problems.

LG FAILS TO RETRACT

- 1. Airspeed 300 kts max.
- 2. LG Handle DN. (Use DN LOCK REL button if required.) **1 W**

If LG comes down normally:

3. GW – Reduce prior to landing.

If LG does not indicate down: 2 C

4. Go to ALTERNATE LG EXTENSION, page E-13.

BLOWN TIRE ON TAKEOFF 3W 4 5W 6C

If takeoff is not feasible:

1. Abort.

If takeoff is continued:

- 1. LG Do not retract.
- 2. Airspeed 300 kts max.
- 3. Refer to LANDING WITH A BLOWN TIRE, page E-9.

OTHER CONSIDERATIONS:

- **1 C** With a blown tire, avoid centerline lights as they may cause wheel damage and subsequent loss of directional control.
- **2**C When landing with a blown MLG tire, the landing gear may collapse during landing roll if portions of the tire remain and cause a wheel imbalance condition.
- **3 W** Failure to depressurize external fuel tank(s) significantly increases the probability of tank explosion and fire if the aircraft departs the runway.
- 4 Delay placing the AIR REFUEL sw to OPEN until all external tanks are empty.
- **5** Use of antiskid minimizes skidding on good tire during braking.
- 6 An approach-end arrestment is recommended. Refer to CABLE ARRESTMENT, page F-13.
- If no approach-end cable is available, land on the side of runway away from the blown tire.
- **8** The NWS light does not illuminate when NWS is engaged if the AIR REFUEL sw is in OPEN.
- 9 Plan to land with approx 1500 lb of fuel on board.
- At 3000 lb fuel remaining, place ENG FEED knob to FYD. When forward reservoir is empty, place ENG FEED knob to NORM. (EmptWING forward tank system takes approx C 15 minutes, D 9 minutes if fuel flow is 4000 pph. When forward tank system empties, the fuel in aft tank system is approx C 2000 lb, D 2400 lb.)
- **11 W** Failure to depressurize external fuel tank(s) significantly increases the probability of tank explosion and fire if the nose gear collapses during the arrestment.
- **12** An approach-end cable arrestment with the nosewheel off the runway is recommended. Refer to CABLE ARRESTMENT, page F-13.

LANDING WITH A BLOWN TIRE 1 C

Landing With A Blown Main Gear Tire 2 C

Prior to landing:

- 1. Retain empty external fuel tank(s) and racks.
- Armament Jettison. Refer to JETTISON, page F-27.
- 3. GW Reduce (if practical).
- 4. TANK INERTING sw TANK INERTING even if Halon is not available.
- 5. AIR REFUEL sw OPEN, if external fuel tank(s) is installed. **3 W** 4
- 6. ANTI-SKID sw ANTI-SKID. **5**
- 7. HOOK sw DN. 6
- 8. Final approach AOA 13°.

If a missed approach-end cable arrestment occurs or no approach-end cable is available: 7

- 9. NWS Engage (if required). **8**
- 10. Brake As desired on good tire.

Landing With A Blown Nose Gear Tire

Prior to landing:

- 1. Retain empty external fuel tank(s) and racks.
- 2. Armament Jettison. Refer to JETTISON, page F-27.
- 3. GW Reduce (if practical). 9
- 4. Fuel distribution All fuel in aft tank system (if practical). **10**
- 5. TANK INERTING sw TANK INERTING even if Halon is not available.
- 6. AIR REFUEL sw OPEN, if external fuel tank(s) is installed. 11 W 4
- 7. HOOK sw DN. **12**
- 8. Final approach AOA 13°.

(Cont)

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OTHER CONSIDERATIONS:

13 W With a blown NLG tire and loss of NWS, it may not be possible to prevent departure from the runway. A reverse castering effect may occur in which the nosewheel moves opposite to the rudder or differential braking input.

14 The max allowable fuel flow with one reservoir empty is 25,000 pph.

After touchdown:

9. Stick – Lower nose to approx 5º pitch attitude for arrestment.

After cable engagement:

10. Stick – Apply aft stick after nose starts down to reduce load on the NLK.

If a missed cable engagement occurs:

11. Maintain pitch attitude and go around.

13 W 14

- **PW220** / **PW229** Nozzle remains closed, resulting in higher than normal landing thrust.
- 2 After a successful alternate gear extension with the landing gear handle still up, the LG handle warning light remains on to indicate the position of the gear handle is not in agreement with the actual gear position.
- If alternate LG extension was performed and one or more LG indicate unsafe, refer to ALTERNATE LG EXTENSION, page E-13.
- 4 C If the LG previously failed to retract, do not cycle the LG handle. Damage to the LG or LG doors may preclude successful extension.
- **5 W** With the LG handle down, if normal LG down indications change to unsafe for one LG (i.e. WHEELS down light off and LG handle warning light on), the overcenter lock on the LG drag brace assembly may not be functioning properly. The LG may appear down, but the LG may collapse during landing. Plan on using the LANDING WITH LG UNSAFE/UP procedures even if the LG subsequently indicates normal. Refer to LANDING WITH LG UNSAFE/UP, page E-15.
- 6 If the NLG WHEELS down light is off, confirmation of the NLG position can be made by checking landing/taxi light operation. Illumination of either light confirms that the NLG is down. With the NLG WHEELS down light off, NWS may be inoperative (without a NWS FAIL caution light).
- From the front cockpit, the top of the speedbrakes should be slightly above a line drawn from the tip of the horizontal tail to the top of the vertical tail root fairing.
- **8** C If RMLG WHEELS down light is off, speedbrakes may not be limited to 43°.

LG HANDLE WILL NOT LOWER

If LG Handle cannot be lowered normally:

1. DN LOCK REL button – Depress and lower LG Handle.

If LG handle still cannot be lowered:

- 2. ALT FLAPS sw EXTEND.
- 3. BRAKES channel sw CHAN 2.
- 4. Go to ALTERNATE LK EXTENSION, page E-13.

1 2

LG FAILS TO EXTEND/ABNORMAL INDICATIONS 3 4C

If abnormal LG down indication(s) is present after LG Handle is lowered (i.e., LG Handle warning light on and/ or WHEELS down light(s) off): 5 W 6

1. LG Handle – Cycle and monitor LG Handle warning light and WHEELS down lights.

If LG Handle warning light came on when the LK handle was lowered, then went off, and tests good or if WHEELS down lights operated normally:

- Speedbrakes Adjust to opening less than 43° (if required). 7
- 3. Land normally.

If LG Handle warning light did not illuminate or remained illuminated after LG Handle was lowered and if one or more WHEELS down lights did not illuminate:

4. Go to ALTERNATE LG EXTENSION, page E-13.

- **1** W ◆ Do not delay lowering LG below 2000 feet AGL.
- ◆ If LG handle does not lower, select BRAKES CHAN 2 and position ALT FLAPS sw to EXTEND.

 PW200 / PW229 Nozzle remains closed, resulting in higher than normal landing thrust.
- Alternate LG extension can be used up to 300 kts; however, the NLG may not fully extend until 190 kts. Time above 190 kts should be minimized in case there is a leak in the pneumatic lines.
- If an unsafe MLG indication exists and both MLG are out of the wheel wells, pulling the ALT GEAR handle is not recommended.
- **3 C** ◆ NWS is not available following alternate LG extension.
- ◆ Do not depress the ALT GEAR reset button while pulling the ALT GEAR handle. This action may preclude successful LG extension.
- ◆ Pulling the ALT GEAR handle with normal system B hydraulic pressure, e.g., NLG fails to extend, may result in hydraulic system B failure within 15 minutes.
- If possible, get visual confirmation of LG position. If all WHEELS down lights were initially off with the LG handle down and use of the hook may be required after touchdown, verify before landing that the hook extends.
- **5** C If the LG was alternately extended due to failure of system B, only brake/JFS accumulator braking is available and after stopping, the parking brake should be engaged until chocks are installed.
- **6** Up to 300 kts may be required to provide sufficient g force.
- If possible, get visual confirmation of LG position.
- **8** From the front cockpit, the top of the speedbrakes should be slightly above a line drawn from the tip of the horizontal tail to the top of the vertical tail root fairing.
- **9** C If RMLG WHEELS down light is off, speedbrakes may not be limited to 43°.

ALTERNATE LG EXTENSION

- 1. LG Handle DN. (Use DN LOCK REL, if required.) **1 W**
- 2. ALT GEAR handle Pull (if required) (190 kts, if practical). 2 3 C

If LG indicates safe:

- 3. Land normally. 4
- 4. Stop straight ahead on the runway. **5** C

If LG indicates unsafe:

3. Stick − Apply alternating g forces (−1.0 to +3.0g) to free LG. 6

If LG indicates safe:

- 4. Land normally. **7**
- 5. Stop straight ahead on the runway. **5 C**

If LG still indicates unsafe:

- 4. Speedbrakes Adjust to opening less than 43° (if required). **8 9 C**
- 5. Go to LANDING WITH LG UNSAFE/UP, page E-15.

- 1 Prior to landing with any of the LG unsafe or up, consider the following:
- Airfield facilities.
- · Hook engagement limits.
- Crosswind component.
- Runway and overrun conditions.
- **2 W** If time permits, delay landing until external fuel tank(s) are empty. If an immediate landing is required, jettison all external fuel tank(s).
- **3 W** Failure to depressurize external fuel tank(s) significantly increases the probability of tank explosion and fire.
- 4 Delay placing the AIR REFUEL sw to OPEN until all external fuel tank(s) are empty.
- If either MLG is not extended, EPU operation cannot be terminated with the EPU sw after engine shutdown. If time permits, refer to ACTIVATED EPU/HYDRAZINE LEAK, page F-13.

LANDING WITH LG UNSAFE/UP 1

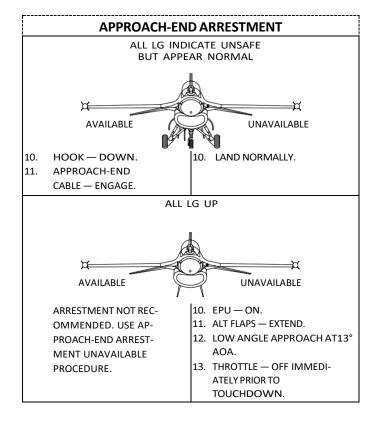
If conditions are not favorable:

1. Refer to EJECTION (TIME PERMITTING), page F-23.

To accomplish the landing:

- Retain empty fuel tank(s) and racks. An empty centerline tank should be retained.
 2 W
- 2. Armament Jettison.
- 3. GW Reduce.
- 4. TANK INERTING sw TANK INERTING even if Halon is not available.
- 5. AIR REFUEL sw OPEN. **3 W 4**
- 6. FCR OFF.
- 7. ST STA/HDPT/ECM power Off.
- 8. SHOULDER HARNESS knob LOCKED.
- 9. Go to page E-16. **5**

(Cont)



APPROACH-END ARRESTMENT

BOTH MLG UP OR UNSAFE



- 10. ALT GEAR HANDLE IN.
- 11. WAIT 5 SEC.
- 12. LG HANDLE UP.
- 13. ALT GEAR RESET BUTTON DEPRESS (2 SEC).
- 14. USE ALL LG UP PROCE-DURE.
- 15. IF NLG DOES NOT RETRACT:
 - a. HOOK DOWN.
 - b. LOW ANGLE APPROACHAT 11° AOA.
 - c. ATTEMPT A FLY-IN ENGAGEMENT.
 - d. THROTTLE OFF AFTER ENGAGEMENT.

WARNING

IF THE ENGAGEMENT
IS MISSED, MAINTAIN
WINGS LEVEL AND
GO AROUND. IF A
GO-AROUND IS NOT
ACCOMPLISHED,
THE AIRCRAFT MAY
GROUND LOOP.

- 10. ALT GEAR HANDLE IN.
- 11. WAIT 5 SEC.
- 12. LG HANDLE UP.
- 13. ALT GEAR RESET BUT-TON — DEPRESS (2 SEC).
- 14. USE ALL LG UP PROCEDURE.
- 15. IF NLG DOES NOT RETRACT:
 - a. CONSIDER LANDING FROM LOW ANGLE AP-PROACH AT 13° AOA IF WING FUEL TANKS ARE CARRIED.
 - b. RECOMMEND EJEC-TION IF WING FUEL TANKS ARE NOT CAR-RIED OR IF CONDI-TIONS ARE NOT CON-SIDERED FAVORABLE FOR AN ATTEMPTED LANDING WITH WING FUEL TANKS.

APPROACH-END ARRESTMENT NLG UP OR UNSAFE AVAILABLE UNAVAILABLE ARRESTMENT NOT REC- $\mathsf{EPU}-\mathsf{ON}.$ OMMENDED. USE AP-LOW ANGLE APPROACH AT 13° AOA. PROACH-END ARREST-THROTTLE — OFF AFTER MENT UNAVAILABLE PROCEDURE. TOUCHDOWN. 13. LOWER NOSE TO RUN-YAY BEFORE CONTROL **EFFECTIVENESS BEGINS** TO DECAY. **WARNING** EJECTION IS PREF-**ERABLE TO SLIDING** INTO AN ARREST-MENT CABLE WITH THE NLG COL-LAPSED. THE CABLE MAY SLIDE UP OVER THE NOSE WITH UN-PREDICTABLE AND POTENTIALLY DAN-GEROUS CONSE-QUENCES TO ANY-ONE IN THE COCK-PIT(S). 14. EPU — OFF AFTER STOP.

APPROACH-END ARRESTMENT

ONE MLG AND NLG UP OR UNSAFE



ARRESTMENT NOT RECOMMENDED. USE APPROACH-END ARREST-MENT UNAVAILABLE PROCEDURE.

- 10. ALT GEAR HANDLE IN.
- 11. WAIT 5 SEC.
- 12. LG HANDLE UP.
- 13. ALT GEAR RESET BUT-TON — DEPRESS (2 SEC).
- 14. USE ALL LG UP PROCEDURE.
- 15. IF LG DOES NOT RETRACT:
 - a. $\mathsf{LG}\,\mathsf{HANDLE}-\mathsf{DN}.$
 - b. CONSIDER LANDING FROM A LOW ANGLE APPROACH AT 13° AOA IF EXTERNAL FUEL TANK(S) IS CARRIED.

NOTE.

LAND ON SIDE OF RUNYAY AYAY FROM THE UNSAFE MLG.

c. RECOMMEND EJECTION IF EXTERNAL
FUEL TANK(S) IS NOT
CARRIED OR IF CONDITIONS ARE NOT
CONSIDERED FAVORABLE FOR AN ATTEMPTED LANDING
WITH EXTERNAL FUEL
TANK(S).

APPROACH-END ARRESTMENT

ONE MLG INDICATES UNSAFE BUT APPEARS NORMAL



- 10. HOOK DOWN.
- 11. LOW ANGLE APPROACH AT 11° AOA.
- 12. AFTER TOUCHDOWN, USE ROLL CONTROL, IF NEC-ESSARY, TO HOLD YING UP. IF ROLL CONTROL IS NEEDED TO HOLD YING ATTITUDE FOR ENGAGEMENT. IF ROLL CONTROL IS NOT NEEDED TO HOLD WING UP, LOWER NOSE FOR ARRESTMENT.
- 13. THROTTLE OFF AFTER ENGAGEMENT.

WARNING

IF THE ENGAGEMENT
IS MISSED AND ROLL
CONTROL YAS NECESSARY TO HOLD
WING UP, MAINTAIN
WINGS LEVEL AND GO
AROUND. IF A GOAROUND IS NOT ACCOMPLISHED, THE AIRCRAFT MAY GROUND
LOOP.

- 10. ALT GEAR HANDLE IN.
- 11. WAIT 5 SEC.
- 12. LG HANDLE UP.
- 13. ALT GEAR RESET BUT-TON — DEPRESS (2 SEC).
- 14. USE ALL LG UP PROCE-DURE.
- 15. IF LG DOES NOT RETRACT:
 - a. LG HANDLE DN.
 - b. CONSIDER LANDING FROM LOW ANGLE APPROACH AT 13° AOA IF EXTERNAL FUEL TANK(S) IS CARRIED.

NOTE

LAND ON SIDE OF RUNYAY AYAY FROM THE UNSAFE MLG.

c. RECOMMEND EJECTION IF EXTERNAL
FUEL TANK(S) IS NOT
CARRIED OR IF CONDITIONS ARE NOT
CONSIDERED FAVORABLE FOR AN ATTEMPTED LANDING
WITH EXTERNAL FUEL
TANK(S).

T.O. BMS1F-16CM-1CL-1

LG Unsafe/Up Landing

APPROACH-END ARRESTMENT

ONE MLG UP OR PARTIALLY EXTENDED



- 10. ALT GEAR HANDLE IN.
- 11. WAIT 5 SEC.
- 12. LG HANDLE UP.
- ALT GEAR RESET BUT-TON — DEPRESS (2 SEC).
- USE ALL LG UP PROCE-DURE.
- 15. IF LG DOES NOT RETRACT:
 - a. LG HANDLE DN.
 - b. HOOK DOWN.
 - c. LOW ANGLE APPROACH AT 11° AOA.
 - d. AFTER TOUCHDOWN,

USE ROLL CONTROL TO HOLD WING UP AND MAINTAIN LAND-ING ATTITUDE FOR EN-GAGEMENT.

e. THROTTLE — OFF AFTER ENGAGEMENT.

WARNING

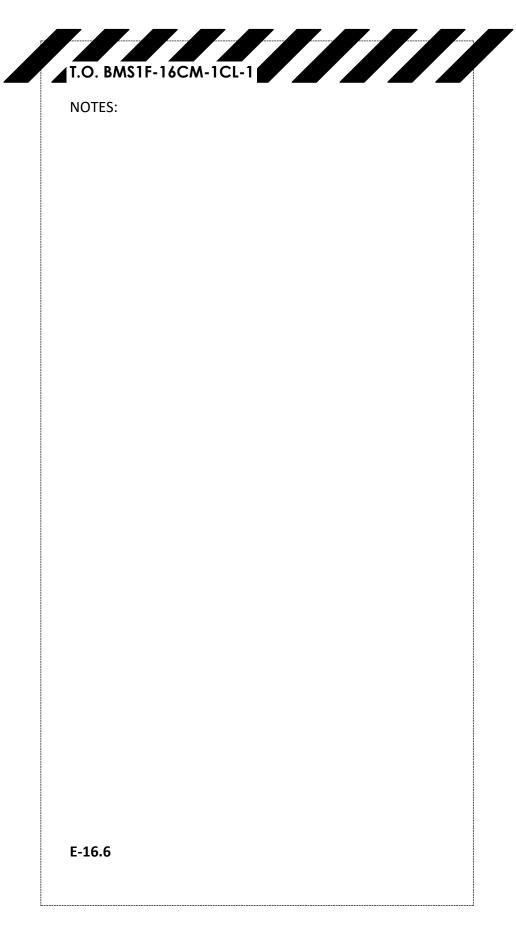
IF THE ENGAGEMENT IS MISSED, MAINTAIN WINGS LEVEL AND GO AROUND. IF A GO-AROUND IS NOT ACCOMPLISHED, THE AIRCRAFT MAY GROUND LOOP.

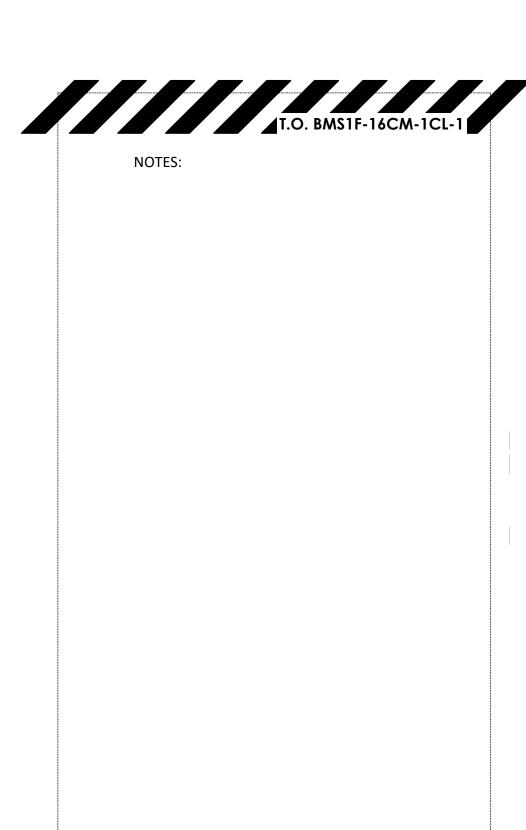
- LO. ALT GEAR HANDLE IN.
- 11. WAIT 5 SEC.
- 12. LG HANDLE UP.
- 13. ALT GEAR RESET BUT-TON — DEPRESS (2 SEC).
- 14. USE ALL LG UP PROCE-DURE.
- 15. IF LG DOES NOT RETRACT:
 - a. LG HANDLE DN.
 - b. CONSIDER LANDING FROM LOW ANGLE APPROACH AT 13° AOA IF EXTERNAL FUEL TANK(S) IS CARRIED.

NOTE.

LAND ON SIDE OF RUNYAY AYAY FROM THE UNSAFE MLG.

c. RECOMMEND EJECTION
IF EXTERNAL
FUEL TANK(S) IS NOT
CARRIED OR IF CONDITIONS ARE NOT
CONSIDERED FAVORABLE FOR AN ATTEMPTED LANDING
WITH EXTERNAL FUEL
TANK(S).

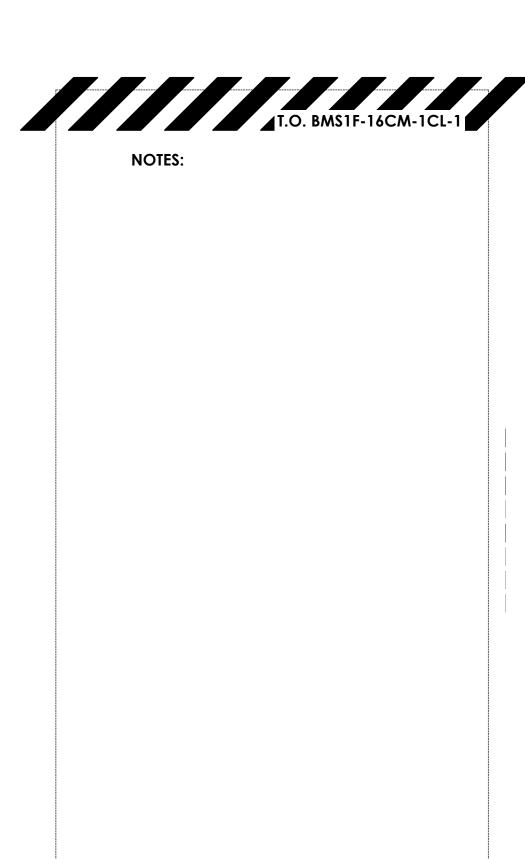




T.O. BMS1F-16CM-1CL-1

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F-3

- **1 W** ◆ When braking absorbs a high amount of energy, do not shut down engine until firefighting equipment is available and do not use the parking brake.
- ◆ Hot wheels and brakes may ignite leaking hydraulic fluid or **PW220** fuel drained overboard during engine shutdown. Wheel fusible plugs may relieve tire pressure within 15 minutes after stop.
- **2 W** When the throttle is retarded to IDLE from MAX AB, the thrust and rpm decay to idle can take up to 2-4 seconds. Do not mistake high thrust/rpm for failure of the engine to respond to the idle command. Engine shutdown from MAX AB may result in a tailpipe fire.
- **3 W** The hook may miss the cable if the aircraft is not slow enough to compress the MLG struts sufficiently to make WOW or if forward stick pressure is held.
- 4 With engine shut down, NWS is lost and EPU does not activate automatically. After hydraulic pressure drops, braking is available using the brake/JFS accumulators only. Stop straight ahead and engage parking brake.

ABORT 1W

- 1. Throttle IDLE. **2** W
- 2. Wheel brakes Apply (as required).
- 3. HOOK sw DN (if required). **3** W

If on fire:

- 4. Throttle OFF. 4
- 5. FUEL MASTER sw OFF.

- **1 W** Exit over the left side (conditions permitting) to avoid EPU exhaust gases.
- **2 W** ◆ **D** Consider canopy jettison so rear seat occupant can egress more rapidly.
- ◆ Opening the canopy with the MANUAL CANOPY CONTROL handcrank is extremely difficult. If immediate egress is required, the canopy should be jettisoned rather than opened with the handcrank.
- **3 W** ◆ If jettison is unsuccessful, heat, blast, and toxic gas from the rockets may enter the cockpit.
- ◆ To prevent the flow of oxygen into the cockpit after the oxygen hose is disconnected, do not select EMERGENCY.
- **4 W** ◆ Lifting the CANOPY JETTISON T-handle other than straight up may cause the handle to jam.
- ◆ Jettisoning the canopy inside a hardened aircraft shelter or under an aircraft sun screen may be extremely hazardous. The canopy reaches a height of approx C 26 ft, D 17 ft above the ground during jettison from a parked aircraft.
- If conditions permit, consider a go-around if the brakes are found to be inoperative on landing. An approach-end cable arrestment is recommended.
- **6 C** Release brakes prior to changing brake channels or turning antiskid off.
- **7** If in a congested area, use the parking brake immediately to stop.

GROUND EGRESS

- 1. Throttle OFF.
- 2. Ejection safety lever Safe (up).
- 3. Harness and personal equipment Release.
- 4. EPU sw OFF (time permitting). **1** W
- 5. Canopy Open. 2 W

If canopy does not raise:

- 6. OXYGEN 100%. **3 W**
- 7. Canopy Jettison. 4 W

BRAKE FAILURE

Accomplish as many steps as required: 5

- 1. BRAKES channel sw Change channels. 6 C
- 2. BRAKES channel sw CHAN 2.
- 3. ANTI-SKID sw OFF. 6 C
- 4. NWS Engage (if required).
- 5. HOOK sw DN.

If an arresting cable is not available or if at low groundspeed:

6. ANTI-SKID sw - Intermittent PARKING BRAKE, then ANTI-SKID. **7** C

(Cont)

- **8 W** ◆ If hot brakes are suspected, do not use the parking brake. Refer to HOT BRAKES, page F-31, do not taxi the aircraft except for emergency movement.
- ◆ Do not set the parking brake with single brake failure. Single brake failure may indicate a hydraulic leak in the brake itself. In this case, application of the parking brake could deplete the hydraulic system and result in total brake failure. Use continuous pressure on the good brake only.



When stopped:

7. Parking brake – Set as required. **8 W**

1 Use of maximum symmetric pedal pressure provides the best stopping performance. Use differential braking only when essential for directional control. If the ANTI SKID caution light

illuminated above 5 kts groundspeed, the aircraft may oscillate due to pulsating brake pressure (if 15 percent or greater differential pedal pressure is applied).

- 2 C ◆ Release brake pressure before switching to CHAN 2.
- ◆With certain failures, no antiskid protection is available with the ANTI-SKID sw in ANTI-SKID and BRAKES channel sw in CHAN 2. Apply brakes with caution to avoid wheel lockup and blown tires.
- **3 C** ◆ Release brake pressure before switching antiskid off.
- ◆ With certain failures, no antiskid protection is available with the ANTI-SKID sw in ANTI-SKID and BRAKES channel sw in CHAN 2. Apply brakes with caution to avoid wheel lockup and blown tires.
- Below normal taxi speed, the alternate braking mode is only marginally effective. Stopping distance may be shortened with antiskid off.
- ♦ Illumination of the ANTI SKID caution light indicates one of the following: loss of power to the ANTISKID switch, loss of power to one of the brake channels, or the BIT has detected a malfunction of one of the brake channels.
- ◆Cycling the ANTI-SKID sw will not extinguish the light.
- **6** C Touchdown skid control may not be available. Do not apply brakes before touchdown. Braking performance may be degraded, but deceleration and maximum performance skid controls remain active.



ANTISKID MALFUNCTION (GROUND)

If the ANTI SKID caution light illuminates (with the ANTI-SKID sw in ANTI-SKID):

1. Brakes - Apply as needed. 1

If braking performance is degraded:

- 2. BRAKES channel sw CHAN 2. 2 C
- 3. NWS Engage (if required).

If manual braking is desired:

4. ANTI-SKID sw - OFF. **3** C **4**

ANTISKID MALFUNCTION (LANDING)

If the ANTI SKID caution light illuminates (with the ANTI-SKID sw in ANTI-SKID) when the LG handle is lowered: **5**

- 1. BRAKES channel sw CHAN 1.
- 2. Gross weight Reduce.
- 3. Refer to ANTISKID MALFUNCTION (GROUND), above. 6 C

1 Hook engagement limits (all GW's):

BAK-6/-9/-12/-13/-14/-15 and MAAS,and *44B-2L 160/140 (*171) kts

- 2 Attempting to engage an unmodified (nonhook capable) MA-1A will most likely be unsuccessful.
- **3 W** ◆ Cable arrestment at speeds greater than emergency arrestment speed, with offcenter distances greater than 35 ft, or with the nosewheel in the air could result in structural failure of the NLG, hook, and/or hook backup structure.
- ◆ The hook may miss the cable if the aircraft is not slow enough to compress the MLG struts sufficiently to make WOW or if forward stick pressure is held.
- ◆ To prevent hook bounce and possible missed engagement, avoid runway centerline lighting.
- ♠ Approach-end arrestment: Touch down at least 500 ft in front of the cable.
- ◆ Departure-end arrestment: HOOK sw to DN at least 1500 ft before reaching the cable.
- **5 W** Using forward stick pressure to keep an abnormally fast aircraft on the runway for cable engagement will probably result in a missed engagement or failure of the nose tire/NLG.
- **6 C** Do not use brakes while the cable is stretched or while being pulled backward. This action can result in aircraft tipping backward. Control rollback with the throttle.

CABLE ARRESTMENT 1 2 3 W

- 1. GW Reduce (as required).
- 2. HOOK sw DN. 4
- 3. SHOULDER HARNESS knob LOCKED.
- 4. Consider options available if a missed engagement occurs.

Prior to cable engagement:

- 5. Throttle IDLE.
- 6. NWS Engage (if required).
- 7. Engage cable as close to center as possible; nosewheel on the runway (if required) and brakes off. **5 W 6 C**

NET ARRESTMENT

- 1. SHOULDER HARNESS knob LOCKED.
- 2. Brakes Release prior to engagement.
- 3. Throttle Off prior to engagement.

(Cont)

7 W The canopy should be retained throughout the engagement to provide pilot protection. Barrier netting will not prevent subsequent canopy opening/jettison.

Engage net perpendicular to preclude aircraft rotating sideways during the arrestment. Avoid steering back toward the center of the runway just prior to engagement as this could result in a non-perpendicular engagement. Nosewheel steering is not required; however, if engaged, it may be left engaged. The throttle should be retarded to off prior to engagement to reduce the possibility of foreign object damage.

4. Engage net perpendicular, preferably in the center portion of the runway. 7 W 8 C

- 1 Inform landing base of hydrazine leak or EPU operation and request bioenvironmental services support.
- **2 W** Treat any leak as a hydrazine leak until investigation proves otherwise.
- 3 Consider turning the ECS off to prevent the possibility of hydrazine fumes or EPU exhaust gases entering the cockpit.
- **4 C** ◆ If AIR SOURCE knob is placed to OFF, also turn off nonessential avionic equipment as electronic equipment may be damaged.
- ◆ If AIR SOURCE knob is placed in OFF, OBOGS caution light will illuminate. If OXY LOW warning light illuminates before ground crew arrives with oxygen bottle, activate EOS.
- To prevent sitting in a sealed cockpit (hot) without ECS, consider waiting for ground crew to arrive with ladder and oxygen bottle prior to shutting down the engine.

ACTIVATED EPU/HYDRAZINE LEAK

If landing with an activated EPU or a hydrazine leak is detected while the engine is running:

1 2 W

1. OXYGEN – 100%.

When on the ground:

- 2. AIR SOURCE knob OFF (if required).3 4 C 5
- 3. Taxi to designated isolated parking area (if required) and park aircraft with left wing into wind if possible.
- 4. Insure all nonessential personnel are clear.
- 5. EPU sw OFF. **6 C**
- 6. Shut down the engine (after left main wheel is chocked). 7

1 W NWS malfunctions at any speed may cause an abrupt turn, tire skidding or blowout, aircraft tipping, and/or departure from the prepared surface.



NWS FAILURE/HARDOVER 1W

- 1. NWS Disengage.
- 2. AR/NWS light Verify off.
- 3. Rudder and brakes As required.

1 Certain ECS equipment malfunctions result in temporary shutdown of the ECS and illumination of the EQUIP HOT caution light.

- ♦ An ECS shutdown and EQUIP HOT caution light illumination for up to 2 minutes can occur during operation above a line from 42,000 ft MSL at 0.2 mach to 50,000 ft MSL at 0.95 mach. This shutdown is normal, but may still require additional action if the EQUIP HOT light remains on for more than 1 minute.
- ◆ If cockpit temperature is excessive, refer to COCKPIT PRESSURE/TEMPERATURE MALFUNCTION, page F-21.
- If OXY LOW warning light remains on for more than 10 seconds or any physiological symptoms are felt, activate EOS (green ring) and descend below 10,000 feet cockpit altitude.

EQUIP HOT CAUTION LIGHT

If EQUIP HOT caution light illuminates: 1

- 1. AIR SOURCE knob Confirm in NORM if smoke or fumes are not present.
- 2. Throttle 80 percent rpm min (in flight).

If EQUIP HOT caution light remains on after 1 minute:

- 3. Nonessential avionics Off.
- 4. Land as soon as practical.

OXYGEN MALFUNCTION LESS 2

If OXY LOW caution light illuminates:

1. Cockpit pressure altitude - 10,000 ft max.

If unable to descend immediately:

- 2. Emergency oxygen Activate.
- 3. Oxygen hose Disconnect.

OBOGS MALFUNCTION

If OXY LOW warning light illuminates:

1. OXYGEN regulator pressure and cockpit altitude – Check.

If pressure is less than 5 psi and cockpit altitude is above 10,000 ft, or if pressure is greater than 5 psi and cockpit altitude is above 25,000 ft:

- 2. EOS Activate.
- 3. Altitude Descend to cockpit altitude below 10,000 ft.
- 4. Land as soon as practical.

If pressure is less than 5 psi and cockpit altitude is below 10,000 ft:

3. Land as soon as practical. 3

(Cont)

T.O. BMS1F-16CM-1CL-1

- 3 Do not exceed cockpit altitude of 10,000 ft.
- 4 Partial pressure of oxygen is sufficient for operation in 100% but is not sufficient for operation in NORM.
- **5** Partial pressure of oxygen is not sufficient.
- **6** OBOGS monitor has failed.
- **7** Returns OXY LOW warning light to steady.

If pressure is less than 5 psi and cockpit altitude is below 10,000 ft:

2. Land as soon as practical. 3

If pressure is greater than 5 psi and cockpit altitude is below 25,000 ft:

2. Diluter lever - 100%.

If OXY LOW warning light goes off within 10 sec: 4

3. Continue mission with diluter lever in 100%.

If OXY LOW warning light remains on or diluter lever was in 100% when light illuminated:

3. OBOGS BIT sw - BIT.

If OXY LOW warning light remains on steady: 6

- 4. EOS Activate if cockpit altitude is above 10,000 ft.
- 5. Altitude Descend to cockpit altitude below 10,000 ft.
- 6. Land as soon as practical.

If OXY LOW warning light begins flashing when BIT is selected: $\overline{7}$

- 4. OBOGS BIT sw BIT. **8**
- 5. Altitude Descend to cockpit altitude below 10,000 ft.
- 6. Land as soon as practical.

- All unidentified odors will be considered toxic. Do not take off when unidentified odors are present. Do not confuse ECS condensation for smoke.
- 2 External fuel cannot be transferred in OFF or RAM. Consider jettisoning tank(s) to decrease drag if range is critical and the ECS cannot be turned on for short periods of time to transfer fuel.
- **3 W** If AIR SOURCE knob is placed to OFF or RAM, OBOGS is inoperative. Activate EOS if OXY LOW warning light illuminates above 10,000 ft cockpit altitude.
- ◆ Smoke in the cockpit may be indicative of an engine oil system malfunction. If possible, retard throttle to lowest setting possible to sustain flight and monitor the OIL pressure indicator. Refer to OIL SYSTEM MALFUNCTION, page C-19, if appropriate.
- ◆ Any odor that smells of burning flesh may be indicative of bird ingestion into the engine. Monitor engine instruments for signs of abnormal operation.

PBG MALFUNCTION

If excessive pressure is experienced or high pressure continues after g is reduced:

1. OXYGEN mode lever - ON.

If pressure is not relieved:

- 2. Oxygen hose Disconnect.
- 3. Cockpit pressure altitude 10,000 ft max.

If unable to descend immediately:

- 4. Emergency oxygen Activate.
- 5. Land as soon as practical.

SMOKE OR FUMES 1

If smoke or fumes are detected:

- 1. OXYGEN regulator Check ON, 100%, and EMERGENCY.
- 2. Altitude 25,000 ft max (18,000 ft if conditions permit).
- 3. Airspeed 500 kts max.
- 4. AIR SOURCE knob RAM. 2 3 W
- 5. Nonessential electrical equipment Off.
- 6. Determine cause of smoke or fumes and correct (if possible). 4
- 7. Land as soon as possible.

If cockpit visibility precludes safe operation:

- 8. Airspeed 180 kts max.
- 9. Seat Full down.
- 10. ALT FLAPS sw EXTEND.
- 11. Canopy Jettison.

OTHER INDICATIONS:

• CABIN PRESS caution light.

OTHER CONSIDERATIONS:

- **1** W ◆ With the ECS shut down or the AIR SOURCE knob in OFF or RAM, the g-suit does not inflate and PBG is disabled.
- ◆ With the ECS shut down or the AIR SOURCE knob in OFF or RAM, OBOGS is inoperative. Activate EOS if OXY LOW warning light illuminates above 10,000 ft cockpit altitude.
- The OBOGS caution light may illuminate as a result of ECS cycling or temporary ECS shutdown. This is normal as long as the OXY LOW warning light does not illuminate.
- Most AUTO position temperature failures can be corrected by use of the MAN position.
- 4 The OBOGS caution light illuminates while AIR SOURCE knob is in OFF.
- **5 W** With the ECS shut down or the AIR SOURCE knob in OFF or RAM, OBOGS is inoperative. Activate EOS if OXY LOW warning light illuminates above 10,000 ft cockpit altitude.
- **6** ◆ External fuel cannot be transferred in OFF or RAM. Consider jettisoning tank(s) to decrease drag if range is critical and the ECS cannot be turned on for short periods of time to transfer fuel.
- ◆ With OBOGS inoperative, the BOS will supply oxygen for approx C 3-5 minutes, D 2-3.5 minutes with both cockpits occupied or 4-7 minutes with one cockpit occupied. The EOS will supply oxygen for 8-12 minutes.

COCKPIT PRESSURE/TEMPERATURE MALFUNCTION 1 W 2 3

If the cockpit temperature is excessive and does not respond to AUTO, MAN or OFF temperature commands or cockpit pressure is lost, proceed as follows:

- 1. OXYGEN 100%.
- 2. Altitude 25,000 ft max (18,000 ft if conditions permit).
- 3. Airspeed 500 kts max.
- 4. AIR SOURCE knob OFF (10-15 sec), then NORM. 4

If cockpit pressure is not regained but all other systems dependent on the ECS are operational:

5. Flight may be continued below 25,000 ft (18,000 ft if conditions permit).

If ECS has failed or cockpit temperature control is not regained:

- 5. AIR SOURCE knob OFF. **5 W 6**
- 6. AIR SOURCE knob RAM (after cockpit is depressurized). **5 W**
- 7. Nonessential electrical equipment Off.
- 8. Land as soon as practical.
- Check for failed emergency dc bus(es).
 Refer to EMERGENCY POWER
 DISTRIBUTION, page A-19.

1 W Failure to remove night vision goggles (NVG) prior to ejection may cause serious injury. If unable to remove NVG, a proper ejection body position (head back against the seat headrest) reduces the chance of injury from the NVG.

2 Slow to lowest practical airspeed.

3 W If canopy is jettisoned or manually released/opened after pulling the ejection handle, the ejection seat functions immediately after canopy separation. Be prepared to immediately put arm back in ejection position when the canopy starts to separate.

4 W Lifting the CANOPY JETTISON T-handle other than straight up may cause the handle to jam.

5 W Use of the CANOPY JETTISON T-handle or MANUAL CANOPY CONTROL handcrank may result in serious injury. To minimize chances of injury, immediately release the handle when the canopy starts to separate.

EJECTION

Ejection (Immediate)

1. Ejection handle – Pull.

Ejection (Time Permitting)

- 1. IFF MASTER knob EMER.
- 2. ZEROIZE sw (combat status) ZEROIZE.
- 3. Loose equipment and checklist Stow.
- 4. Lapbelt and helmet chin strap Tighten.
- 5. Night vision devices Remove (if appropriate). 1 W
- 6. HMCS Manually disengage QDC (if necessary).
- 7. Visor Down.
- 8. Throttle IDLE. 2
- 9. Assume ejection position.
- 10. Ejection handle Pull.

Failure of Canopy To Separate 3 W

- 1. Canopy Open normally.
- 2. Canopy Jettison. 4 W
- MANUAL CANOPY CONTROL handcrank Push in and rotate ccw. 5 W

1 W ◆ Arms must be kept close to body to avoid letting wind blast pull arms out of the cockpit.

- ◆ HUD glass disintegration can be expected following medium to high energy bird strike with or without canopy penetration.
- ◆ Canopy damage may cause loss of the canopy without warning.

CANOPY MALFUNCTIONS

CANOPY Warning Light On

If CANOPY warning light illuminates:

1. Canopy handle – Push outboard.

If CANOPY warning light remains on:

2. Go to CANOPY DAMAGE/LOSS IN FLIGHT, below.

Canopy Damage/Loss in Flight 1 W

If canopy loss/penetration has occurred:

- 1. Airspeed 180 kts max.
- 2. Seat Full down.
- 3. ALT FLAPS sw EXTEND.
- 4. Land as soon as possible.

Failure of Canopy To Separate

Go to EJECTION, page F-23.

- **1** D Store and station selections can be made from either cockpit.
- **2** C ◆ Jettison of an inboard shoulder-mounted store from a TER at station 4 or 6 with MLG down may result in LG and store(s) collision. To avoid this, select RACK for jettison instead of WPN.
- ◆ Jettison of external wing fuel tanks with stores/suspension equipment at stations 3 and/or 7 with MLG down may result in LG and external wing fuel tank collision.
- ◆ Failure to load the actual stores configuration into SMS inventory could cause damage to the aircraft by inhibiting the selective jettison release time delay used to ensure safe 370/600-gallon fuel tank separation when a store is present at station 3 or 7.
- ◆ Selective jettison airspeed/mach limits in T.O. BMS1F-16CM-1CL-1, are only valid for:
- Selective jettison of one store type at a time.
- Selective jettison from nonadjacent stations.

If simultaneous selective jettison of either more than one store type or from adjacent stations is required, adhere to emergency jettison airspeed/mach limits.

- **3** ◆ Weapon(s) and/or rack(s) to be jettisoned is highlighted.
- ♦ When 300-gallon and 370/600-gallon fuel tanks are carried simultaneously, the 300-gallon fuel tank must be separated prior to the 370/600-gallon fuel tanks.
- If the initial actuation of the WPN REL or ALT REL button fails to jettison all aircraft stores, subsequent attempts may successfully release the remaining stores.
- **5** Use EMER STORES JETTISON on the ground only as a last resort.
- **6 W** Emergency jettison is not available if an MMC FAIL PFL message is present. Emergency jettison can be restored by placing the MMC sw to OFF.
- If the initial actuation of the EMERG STORES JETTISON button fails to jettison all aircraft stores, subsequent attempts may successfully release the remaining stores.

SELECTIVE JETTISON

- 1. GND JETT ENABLE sw ENABLE (if LG is down).
- 2. MASTER ARM sw MASTER ARM.
- 3. **DR** ARMT CONSENT sw On.
- 4. \overline{ST} STA sw ST STA.
- 5. DOG FIGHT sw Center.
- 6. MFD SMS format. 1
- 7. S-J OSB (MFD) Depress.
- 8. S-J PAGE (MFD) Select stores desired for jettison. 2C 3
- 9. WPN REL or C ALT REL button Depress. 4

EMERGENCY JETTISON

- 1. GND JETT ENABLE sw ENABLE (if required). 5
- 2. EMER STORES JETTISON button Depress (1 sec). 6 W 7

INDICATIONS OF TOTAL EGI FAILURE:

- AVIONICS FAULT caution light.
- · ADI AUX warning flag.
- ADI OFF warning flag.
- HSI compass card frozen.
- ADI frozen/tumbled.
- HUD pitch ladder, heading scale, roll scale, and FPM also blank.
- INS BUS FAIL PFL.
- FLCC AOS feedback function is deactivated.

OTHER CONSIDERATIONS:

1 W It is possible for the displayed ADI and/or HUD attitude to be in error with no ADI OFF or AUX warning flags in view and without an EGI or HUD MFL/PFL. Displayed HSI and/or HUD headings may also be in error with no HSI OFF or ADI AUX warning flags in view and without an EGI or HUD MFL/PFL. Momentary warning flags may indicate impending failure. To detect these failures and maintain proper flight orientation, basic and backup instruments must be cross-checked.

Minimum performance is available with return of the HUD FPM; return of MAX G indicates full performance. INS knob can remain in IN FLT ALIGN to insure the highest performance by continuing the INS updating process.

3 Limit vertical maneuvering until the FPM is displayed on the HUD. Failure to do so could delay or prevent completion of the in-flight alignment.

INS FAILURES

Total INS Failure 1 W

- 1. INS knob OFF for 10 seconds.
- 2. Attitude Straight, level, and unaccelerated.
- 3. INS knob IN FLT ALIGN.
- 4. Magnetic heading Enter.
- 5. Attitude Straight, level, and unaccelerated until ADI OFF warning flag goes out of view after approx 10 seconds.
- 6. Auto or manual in-flight alignment-Accomplish. 2 3

If the ADI OFF and/or AUX warning flag does not go out of view, alignment is not possible and the attitude mode should be attempted:

- 7. INS knob OFF for 15 sec.
- 8. INS knob ATT.
- Attitude Straight, level, and unaccelerated until ADI OFF warning flag goes out of view after approx 10 seconds.
- 10. ADI and HUD Verify attitude information is correct.
- 11. C DF INSTR HDG knob Slew HSI to match best available magnetic heading.

- Insure that AR/NWS light is off prior to landing so that the NWS does not follow rudder commands when the nosewheel is lowered to the runway.
- 2 From the front cockpit, the top of the speedbrakes should be slightly above a line drawn from the tip of the horizontal tail to the top of the vertical tail root fairing.
- **3** C Visually confirm speedbrake opening is limited to 43° to prevent the lower surfaces from striking the runway during landing.
- **4** W ◆ If a hot brake condition is a result of a dragging brake, taxiing the aircraft worsens the condition.
- ◆ Any leaking hydraulic fluid may be ignited by hot wheel and brake surfaces.
- ◆ Wheel fusible plugs may relieve tire pressure at any time during the 15 minutes after brake application.
- ◆ With hot brakes, avoid inflated MLG tire side area within 300 feet for 45 minutes after aircraft has stopped. If required, approach from front or rear for firefighting purposes only.
- **5 W** ◆ When braking absorbs a high amount of energy, do not use the parking brake.
- ◆ If battery power is not available, toe brakes will be inoperative after engine shutdown.
- ◆ Do not turn MAIN PWR sw to OFF until the nosewheel is chocked.
- ◆ Attempt to park in a level area to minimize risk of aircraft rolling if the brakes should fail after shutdown.
- ◆ PW220 Delay engine shutdown until arrival of firefighting equipment because hot wheels and brakes may ignite fuel drained overboard during engine shutdown.
- **6** C Use only minimum possible toe brake pressure to hold aircraft stationary until engine is shut down and nose wheel is chocked.

NLG WOW SWITCH FAILURE

1. NWS - Engage.

If AR/NWS light comes on:

- 2. NWS Disengage.
- 3. AR/NWS light Off. 1
- 4. Speedbrakes Close to less than 43°.2 3 C

HOT BRAKES

Perform the following after any event that may result in hot brakes:

 Request firefighting equipment and proceed directly to the designated hot brake area or nearest area clear of other aircraft and personnel.

When in the hot brake area:

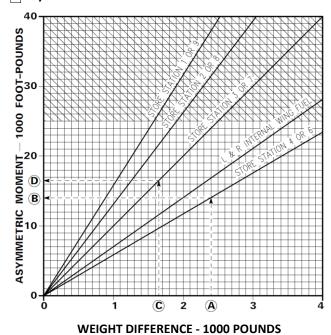
- 2. Align aircraft with nose into wind if possible. **5W 6C**
- 3. EPU sw OFF.
- 4. Throttle OFF.
- 5. Nose wheel Chocked.
- 6. MAIN PWR sw OFF.
- 7. Exit toward the front of the aircraft.

If a brake fire occurs:

8. Go to GROUND EGRESS, page F-7.

1 W Large asymmetric loads severely limit lateral control when rolling away from the heavy wing. Until determining net asymmetry, limit max bank angle change to 90°, avoid abrupt control inputs, and do not exceed 10° AOA.

2 Asymmetric Moment



3 Selectively jettison stores from the heavy wing to obtain a net asymmetry less than 25,020 ft-lb. Refer to SELECTIVE JETTISON,

page F-27.

ASYMMETRIC STORES (LANDING)

- 1. AOA 10° max. **1 W**
- 2. Determine net asymmetry. **2**

If asymmetry is greater than 25,020 ft-lb:

3. Stores – Jettison (as required). **3**

(Cont)

- **4** ◆ Lower LG at a safe altitude and check handling qualities until roll authority is insufficient or up to 12° AOA max.
- ◆ Max maneuvering AOA for approach and landing is 10° AOA or 2° less than the AOA at which roll authority is insufficient to maintain wings level, whichever is less.

5 W The decision to land with a large asymmetry should consider such factors as weather conditions, runway length/width and surface conditions (RCR), arresting gear availability, crosswind component/gusts, and pilot experience.

- **6 W** ◆ With crosswind component greater than 10 kts (5 kts if the net asymmetry exceeds 20,000 ft-lb), land with heavy wing into the crosswind even if this results in landing downwind. Failure to do so may result in inadequate roll control.
- ◆ Do not exceed the max AOA, as determined during the controllability check, during final approach, flare, touchdown, or two-point aerodynamic braking.

If asymmetry is greater than 10,000 ft-lb:

4. Controllability – Check. 4

If landing is feasible: **5 W**

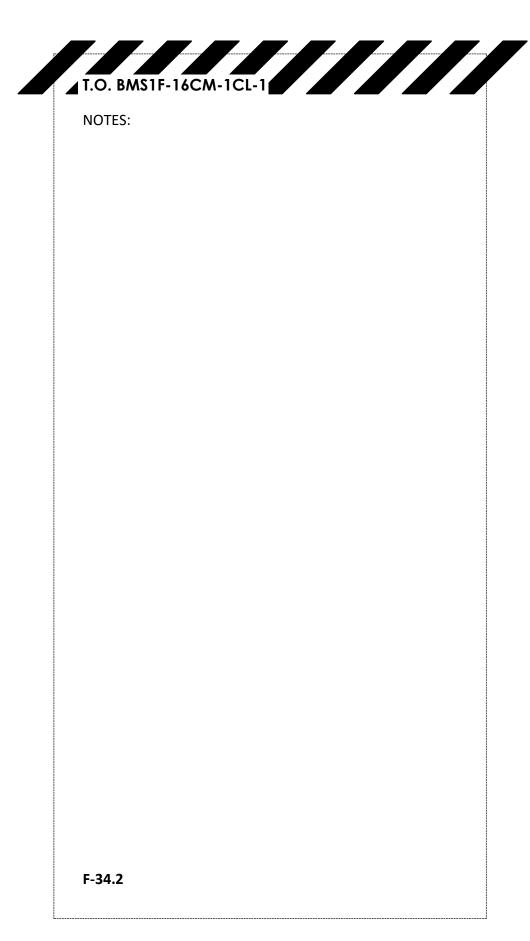
- 5. Fly a shallow, power-on, straight-in approach. **6 W**
- 6. Roll trim and lateral stick As required.
- 7. Rudder trim Trim into the heavy wing (if required).

If landing is not feasible:

5. Go to EJECTION (TIME PERMITTING), page F-23.

If asymmetry is less than 10,000 ft-lb:

4. Land normally.



Warning/Caution Lights

LIGHT	REMARKS	
SEAT NOT ARMED	Ejection safety lever up (system safe)	
STORES CONFIG	STORES CONFIG sw is in incorrect position or loading category in SMS software disagrees with actual KP/ STORE/LINE loading category. Verify STORES CONFIG sw is in proper position for aircraft loading category	
ATF NOT ENGAGED	ADV MODE sw is depressed. (Sw is inoperative)	
RADAR ALT	Malfunction of radar altimeter	
(Mode 4)	MODE 4 REPLY sw in OUT with C& I knob in BACKUP; zeroized or not coded; correct code not selected (A or B); code does not match code interrogation; mode 4 inoperative; or RF sw in QUIET or SILENT	
INLET ICING	If in areas of known or suspected icing conditions, position engine ANTI ICE sw to ON	
НООК	Hook not up and locked	
OBOGS	The ECS pressure has dropped below 10 psi interrupting oxygen production.	

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Warning/Caution Lights

LIGHT	REMARKS
AVIONICS FAULT	Several causes. Note PFL display(s)on PFLD and depress C DF F-ACK, DR FAULT ACK button to acknowledge fault(s) and to reset AVIONICS FAULT caution light. Perform fault recall(s) as desired to determine if the failure condition still exists
TO/LDG CONFIG	All LG not down and locked or TEF's not fully down with LG Handle down
NUCLEAR	Malfunction in nuclear circuitry
PROBE HEAT	Ground: Place PROBE HEAT sw to OFF for 1 minute (caution light goes off) when OFF is selected); then reselect PROBE HEAT. If caution light comes on simultaneously with reselection of PROBE HEAT, aprobe heater or monitoring system failure has occurred. If caution light does not come on when PROBE HEAT is reselected, one/ both AOA probe heaters were shut off to prevent overheat In Flight: Probe heater(s) or monitoring system failure. Place PROBEHEAT sw to PROBE HEAT, if required, and avoid areas of known orsuspected icing conditions

Warning/Caution Lights

LIGHT	REMARKS
6 WARN	Check for specific illuminated warning light
TRP FUEL 0	A trapped external fuel condition is detected

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NOTES:

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SECTION AR

AIR REFUELING PROCEDURES

WITH KC-135, KC-10, AND KDC-10

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KC-10/KDC-10 BOOM FLCS FAILURE	AR-3
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NORMAL AIR REFUELING PROCEDURES

Armament Safety Check

- 1. MASTER ARM switch OFF or SIMULATE.
- 2. LASER ARM switch OFF.
- 3. SMS Confirm ordnance safe.
- 4. CMDS switches (9) OFF.

Precontact

- 1. TACAN As required.
- Emitters (ECM/FCR/RDR ALT) As required (Quiet/Silent/STBY/OFF).
- 3. HOT MIC CIPHER switch HOT MIC.
- 4. Exterior lights (Night) DIM, STEADY.
- 5. ANTI COLLISION light switch (Night) OFF.
- 6. AIR REFUEL switch OPEN.
- 7. AR status indicator light RDY.

Contact

- 1. AR status indicator light AR/NWS.
- 2. Fuel transfer Monitor.

Disconnect

- 1. A/R DISC button Depress momentarily, then release
- 2. AR status indicator light DISC.

Post Air Refueling

- 1. AIR REFUEL switch CLOSE.
- 2. AR status indicator lights(S) Off.
- 3. Fuel quantity Check.
- 4. MASTER ARM switch As required.
- 5. SMS As required.
- 6. CMDS switches (9) As required
- 7. CHAFF/FLARE switches (4) As required
- 8. TACAN As required.
- 9. FCR/Radar As required.
- 10. RDR ALT As required.
- 11. LASER ARM switch As required.
- 12. Exterior lights As required.

AR-2

SYSTEM MALFUNCTIONS

When any system malfunction or condition exists which could jeopardize safety, air refueling will not be accomplished except during fuel emergencies or when continuance of fueling is dictated by operational necessity. 1

Slipway Door Will Not Open

No back-up system is provided to open or close the slip- way door if hydraulic system B fails.

Slipway Door Will Not Close

1. AR switch – CLOSE. **2 3**

Inoperative Boom/Receptacle Latching

Boom operator – Inform of the need to accomplish manual boom/receptacle pressure refueling. 4 W 5 C

KC-10/KDC-10 BOOM FLCS FAILURE

Do not disconnect until cleared by boom operator. $\boxed{\mathbf{6} \ \mathbf{W}}$

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OTHER CONSIDERATIONS:

- 1 Enter any brute force disconnect as a discrepancy in the AFTO Form 781. The entry will specify which type of brute force disconnect occurred.
- **2 C** Following an inadvertent brute force disconnect, air refueling will be terminated except during fuel emergencies or when continuation of air refueling is dictated by operational necessity.
- **3 C** A controlled tension brute force disconnect will be accomplished only as a last resort, after all other normal and emergency methods of disconnect have failed.
- ◆ The receiver pilot must not jerk the boom out with rapid thrust change toward IDLE or by using speedbrakes; to do so may cause serious structural damage. Gradual power reduction will suffice to effect a disconnect.
- ◆ Fly stabilized at contact altitude until certain the nozzle is clear of the receptacle and slipway.
- ◆ Air refueling for the receiver which required controlled tension disconnect will be terminated except during fuel emergencies or when continuation of air refueling is dictated by operational necessity.

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BRUTE FORCE DISCONNECT 1

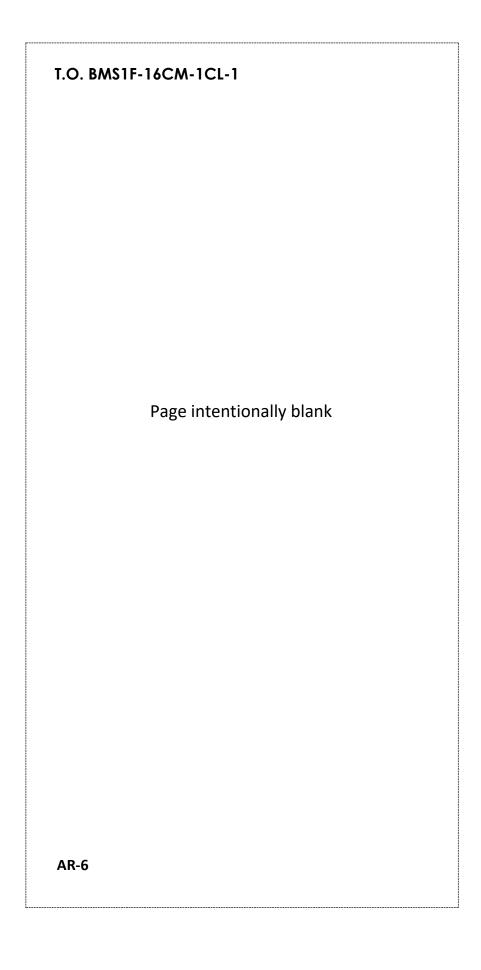
Inadvertent Disconnect

An inadvertent brute force disconnect is defined as any unplanned disconnect which is the result of one of the following:

- The receiver aircraft moving rapidly to the aft limit, causing mechanical tanker/receiver separation.
- Boom pullout occurs at 38 degrees elevation or below. 2 C

Controlled Tension Disconnect

- 1. Slide out boom with gradual power reduction.
- 2. When at full boom extension, tension disconnect will occur with slight power reduction. **3 C**



N
×
EP
EP GROUND
EP TAKEOFF
TAKEOFF
INFLIGHT
EP LANDING
AR

	TABLE
	PW 220
	PW 229
	PW 229
	GE 100
	GE 129